Risk Analysis

Planning Associates

March, 2011

With the incomparable Charles Yoe and the incomprehensible David Moser

Part 1

EXCITING INTRODUCTION TO RISK

Definition

- Define risk using brainwriting technique
- Small groups
- In 2 minutes write a definition of risk
- Pass it left and improve the definition you get in 1 minute (do not rewrite)
- When your original returns improve it
- Vote on or invent best definition from your group
- Report back

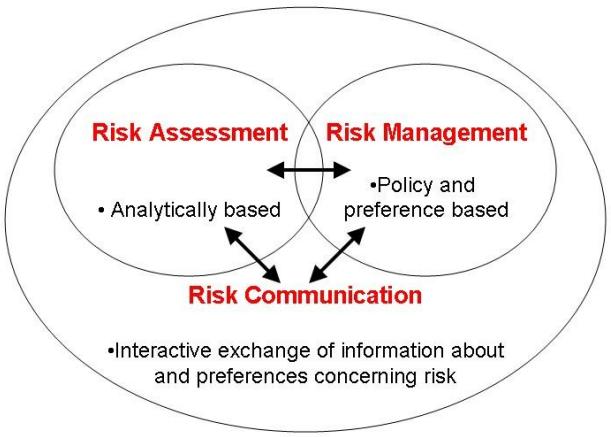
Risk

- Risk is a measure of the probability and consequence of uncertain future events
  - Probability x Consequence
- Risk includes
  - Potential for gain (opportunities)
    - Risk taking
  - Exposure to losses (hazards)
    - Risk avoiding

Risks of Interest

- Existing-risk to life and safety, property damage, et al
- Risk reduction-what can we avoid, prevent, mitigate
- Residual risk-what remains after mitigation, flood hazard that remains
- Transformed risk-slow rise in floodwaters to catastrophic overtopping
- Transferred risk-induced flooding

Risk Management



- Essentially, making decisions under uncertainty
- Planning, analyzing, organizing, implementing and monitoring efforts to control the effects of uncertainty on the Corps' Civil Works Program

Show me the risk

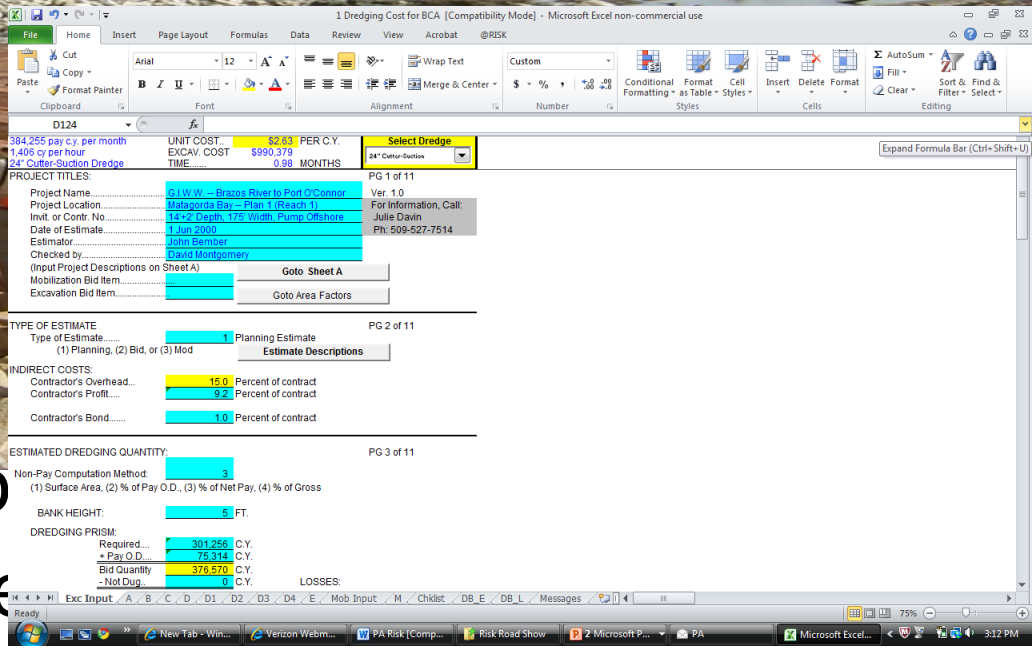
- Identify two or more potential risks for one of the projects you identified from your District on your bio sheets (5 minute max)
- Give us your best example

Show me the uncertainty

- Pick one of the risks we just heard
- What is uncertain about that risk?

An Example

- Cost estimation
  - 4 inputs
- Identify risks
  - What can go wro
  - How can it happe
- Assess the risks
  - What are the consequences?
  - How likely are those consequences?


1 Dredging Cost for BCA [Compatibility Mode] - Microsoft Excel non-commercial use
384,255 pay c.y. per month
1,406 cy per hour
24" Cutter-Suction Dredge
UNIT COST $2.63 PER C.Y.
EXCAV. COST $990,379
TIME 0.98 MONTHS
Select Dredge
PROJECT TITLES:
PG 1 of 11
Project Name G.I.W.W. -- Brazos River to Port O'Connor
Project Location Matagorda Bay -- Plan 1 (Reach 1)
Invit. or Contr. No. 14'+2' Depth, 175' Width, Pump Offshore
Date of Estimate 1 Jun 2000
Estimator John Bember
Checked by David Montgomery
Ver. 1.0
For Information, Call:
Julie Davin
Ph: 509-527-7514
Goto Sheet A
Goto Area Factors
TYPE OF ESTIMATE
PG 2 of 11
Type of Estimate (1) Planning, (2) Bid, or (3) Mod
1 Planning Estimate
Estimate Descriptions
INDIRECT COSTS:
Contractor's Overhead 15.0 Percent of contract
Contractor's Profit 9.2 Percent of contract
Contractor's Bond 1.0 Percent of contract
ESTIMATED DREDGING QUANTITY:
PG 3 of 11
Non-Pay Computation Method:
(1) Surface Area, (2) % of Pay O.D., (3) % of Net Pay, (4) % of Gross
3
BANK HEIGHT: 5 FT.
DREDGING PRISM:
Required 301,256 C.Y.
+ Pay O.D. 75,314 C.Y.
Bid Quantity 376,570 C.Y.
- Not Dug 0 C.Y.
LOSSES:
Exc Input
Ready

Part 2

THRILLING RISK LECTURE

Risk Analysis->Decision-Making Under Uncertainty

Risk analysis is the process of assessing risk and related uncertainties for the purpose of efficacious management of the risk, facilitated by effective communication about the risks

Risk Assessment

- Analytically based

Risk Management

- Policy and preference based

Risk Communication

- Interactive exchange of information, opinions, and preferences concerning risks

Risk Management Model

Risk management is the process of problem finding and initiating action to identify, evaluate, select, implement, monitor and modify actions taken to alter levels of risk, as compared to taking no action.

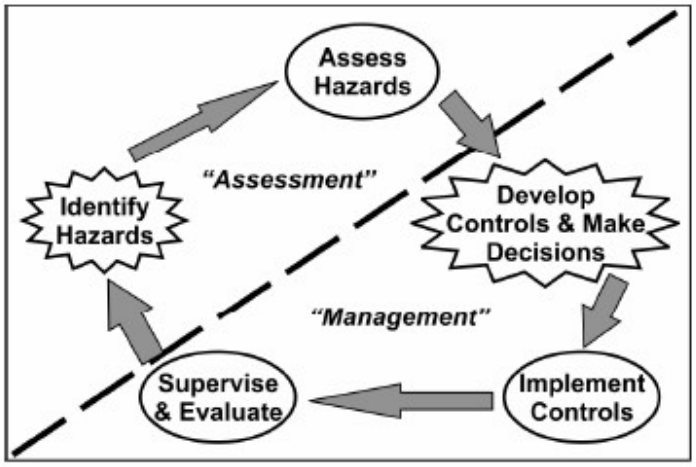
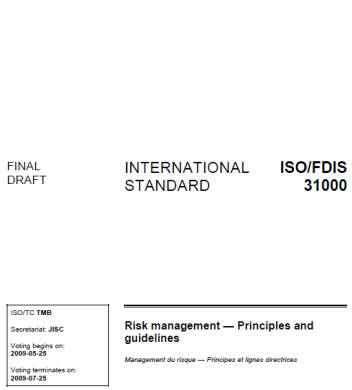


Figure 1-2. CRM process


FINAL DRAFT

INTERNATIONAL STANDARD

ISO/FDIS 31000

ISO/TC TMB

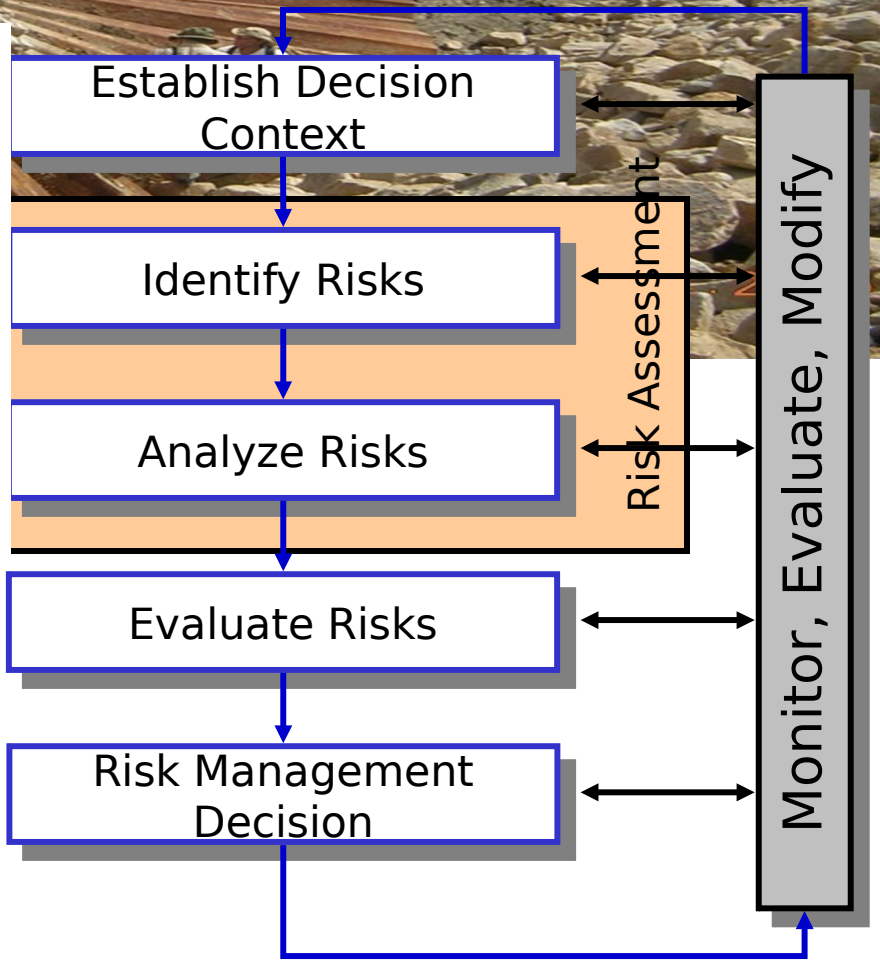
Secretariat: JISC

Voting begins on: 2009-05-25

Voting terminates on: 2009-07-25

Risk management — Principles and guidelines

Management du risque — Principes et lignes directrices

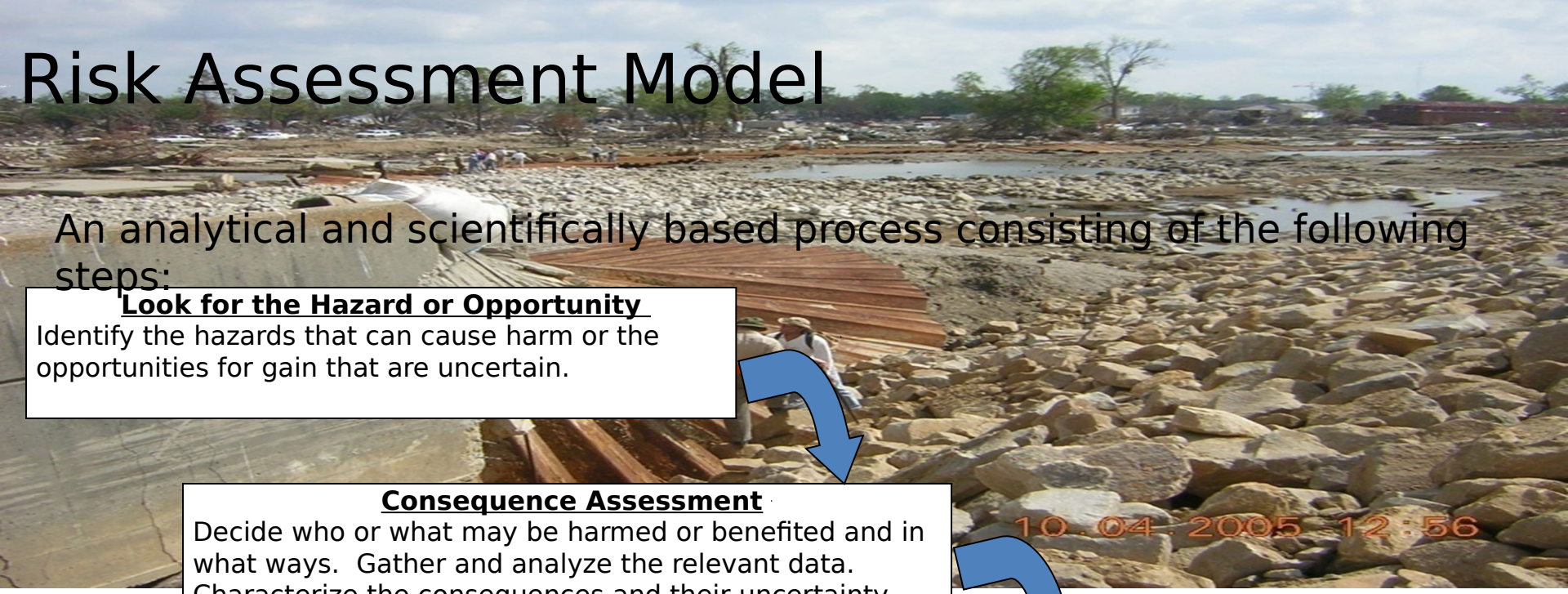


Based on ISO 31000

Risk Assessment

Risk assessment encompasses a variety of analytic techniques that are used in different situations, depending upon the nature of the risk, the available data, and the needs of decision makers. It is a systematic, evidence based approach for quantifying and describing the nature, likelihood, and magnitude of risk associated with the current condition and the same values resulting from a changed condition due to some action.

Risk Assessment Model



An analytical and scientifically based process consisting of the following steps:

Look for the Hazard or Opportunity
Identify the hazards that can cause harm or the opportunities for gain that are uncertain.

Consequence Assessment
Decide who or what may be harmed or benefited and in what ways. Gather and analyze the relevant data. Characterize the consequences and their uncertainty qualitatively or quantitatively.

Likelihood Assessment
Assess the likelihood of the various adverse and beneficial consequences. Characterize these likelihoods and their uncertainty qualitatively or quantitatively.

Risk Characterization
Estimate the probability of occurrence, the severity of adverse consequences, and the magnitude of potential gains, including attendant uncertainties, of the hazards and opportunities identified based on the evidence in the preceding steps. Characterize the risk qualitatively or quantitatively with appropriate attention to baseline and residual risks, risk reductions, transformations and transfers.

Risk assessment encompasses a variety of analytic techniques that are used in different situations, depending upon the nature of the risk, the available data, and the needs of decision makers. It is a systematic, evidence based approach for quantifying and describing the nature, likelihood, and magnitude of risk associated with the current condition and the

Risk Communication

Risk communication is the open, two-way exchange of information and opinion about hazards, opportunities and risks leading to a better understanding of the risks and better risk management decisions.

Risk Communication Goals

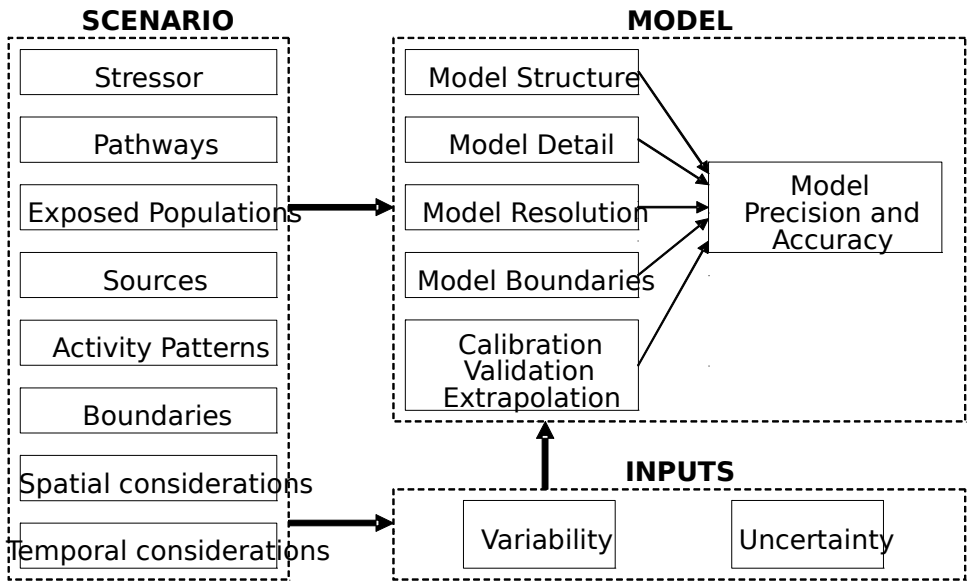
- Tailor communication so it takes into account the emotional response to an event.
- Empowers stakeholders and public to make informed decisions.
- Prevent negative behavior and/or encourage constructive responses to crisis or danger.

Q4U

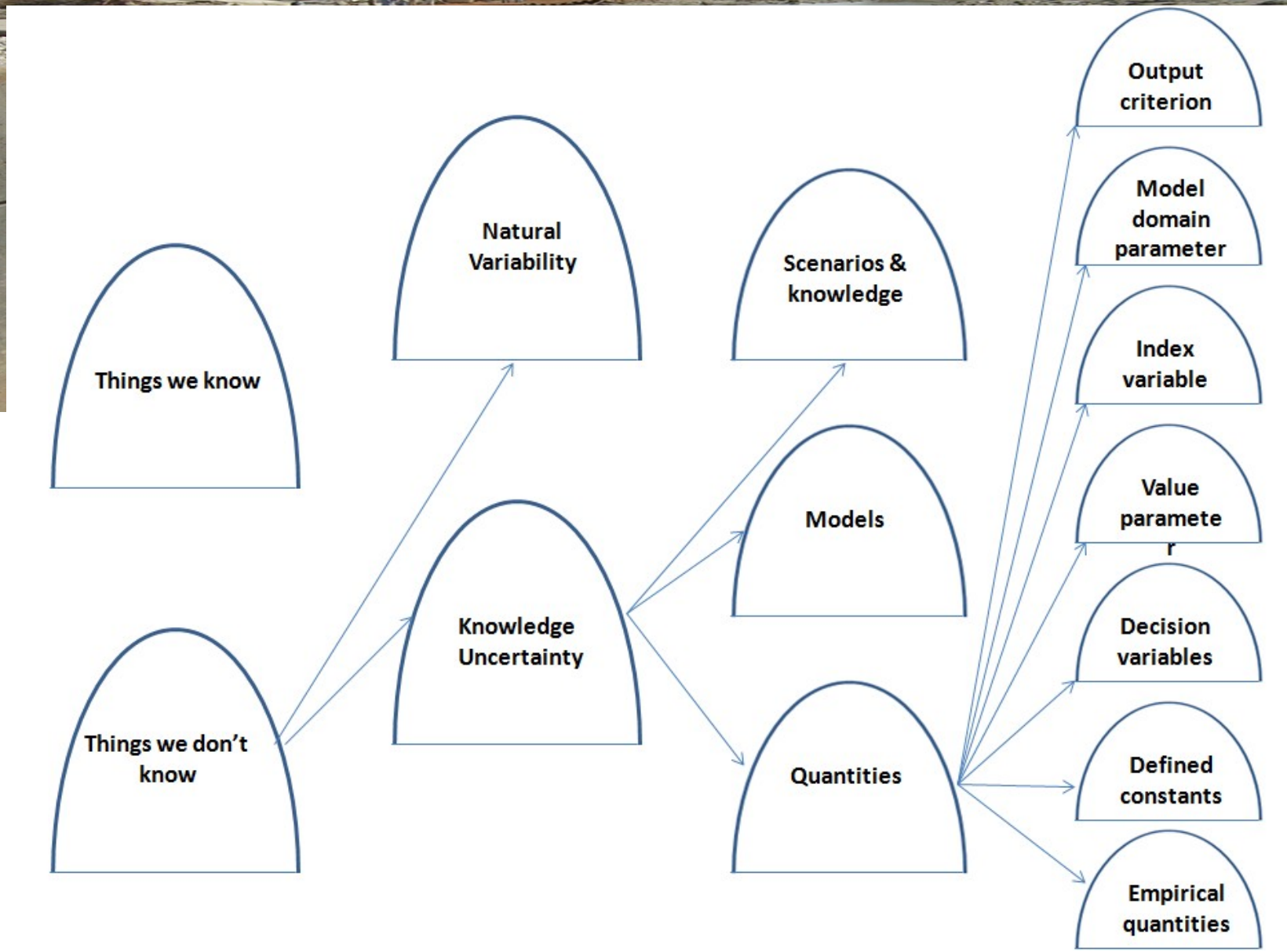
- We have a flood risk management study
- Who are the risk managers?

Uncertainty

- From 75,000 feet
  - Increasing social complexity
  - Increasingly rapid pace of change
  - Global effects, e.g., climate change
- Project level
  - 18 mo. schedule means living with more uncertainty, but how much is already there?



Honest Brokers About Opportunities and Hazards



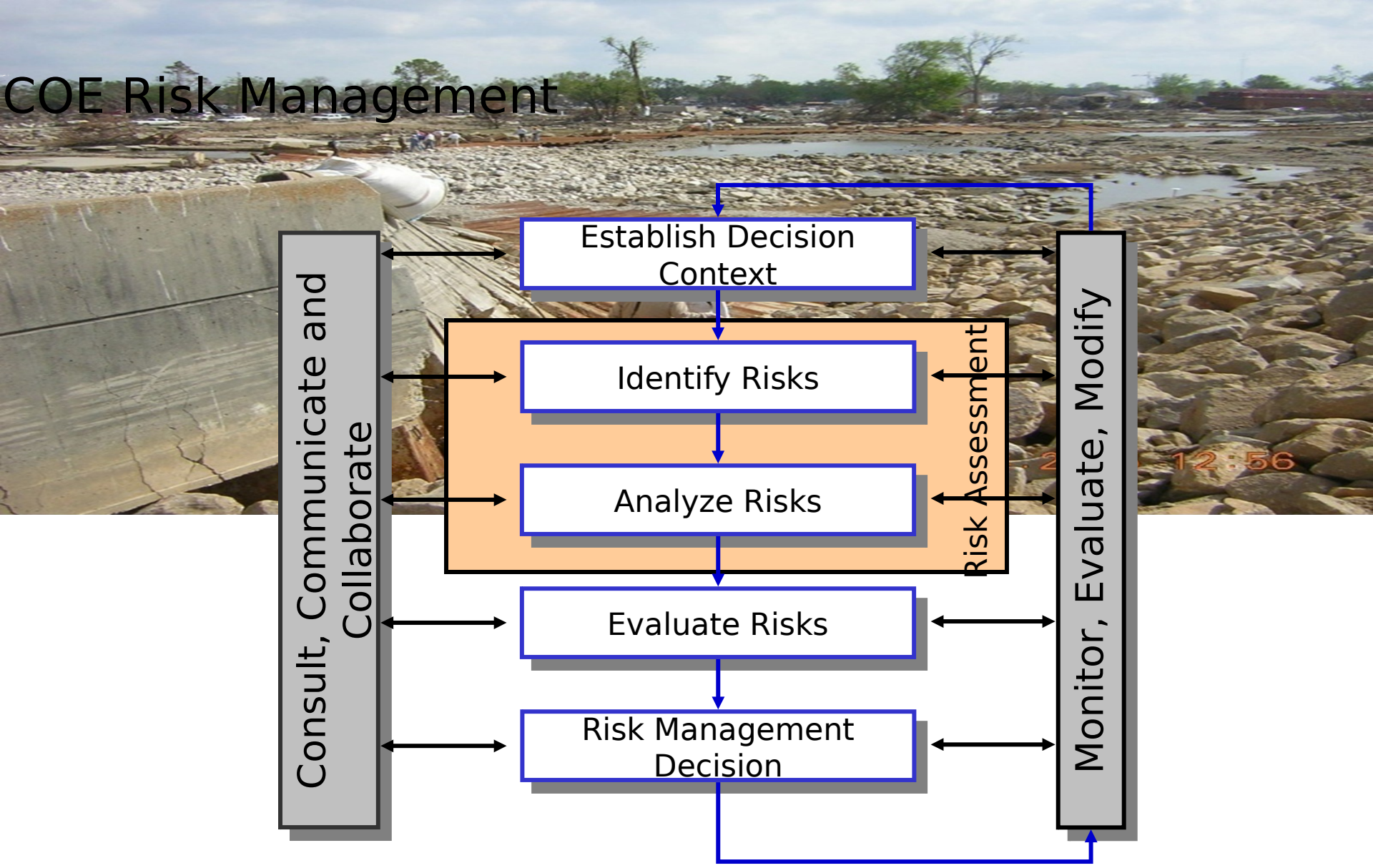
Part 3

BORING DISCUSSION OF INTEGRATING RISK MANAGEMENT INTO PLANNING

Risk Management-Informally

- What is the problem?
- What questions do we want risk assessment to answer?
- What can be done to reduce the impact of the risk described?
- What can be done to reduce the likelihood of the risk described?
- What are the trade-offs of available options?
- What is the best way to address the described risk?
- Is it working?

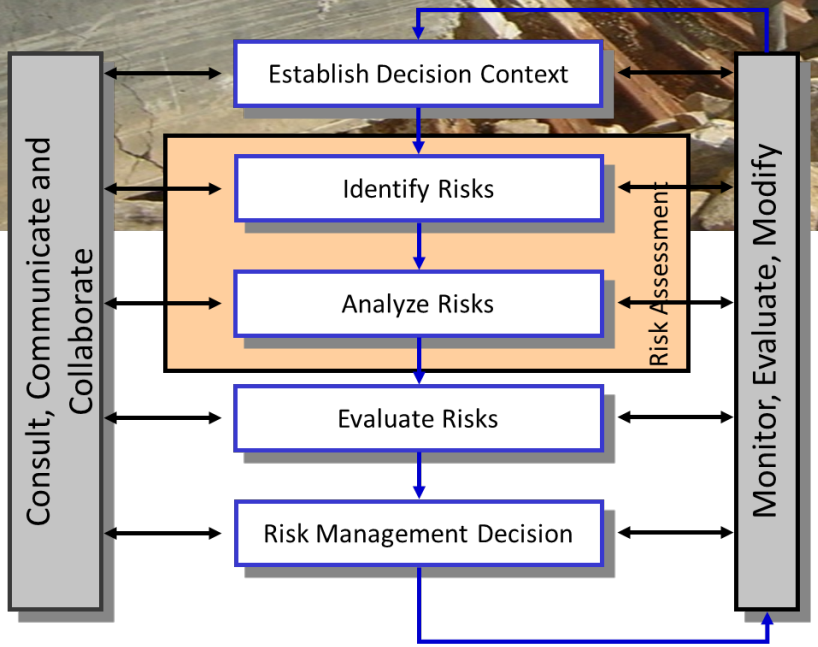
COE Risk Management



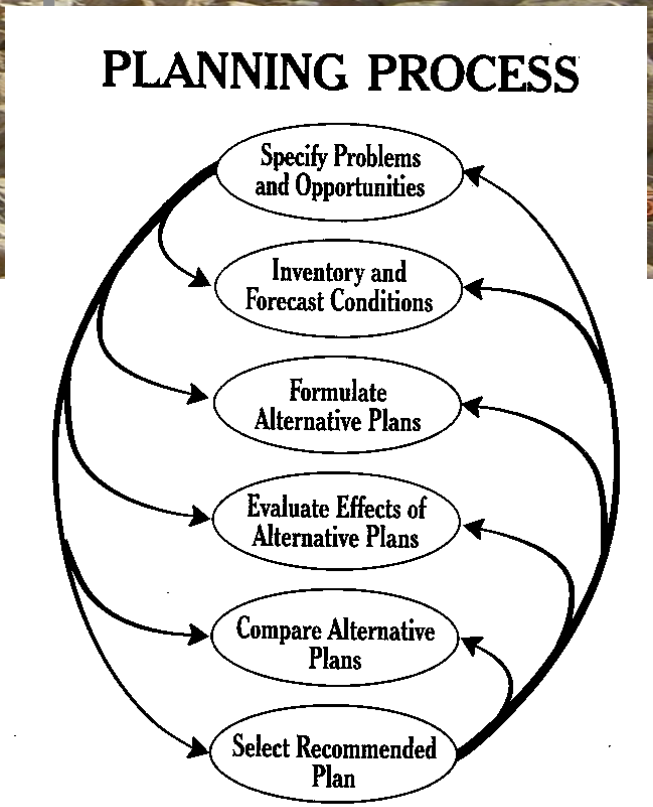
EC = Risk-informed everything

Map It

How does this…



…map into this



Risk-Informed Planning

- What problems do you see?
- What benefits do you see?

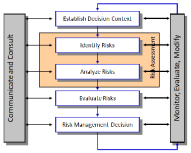
Establish Decision Context

Outputs

- A written problem statement
- A written statement of the activity's objectives
- A written list of management information questions
- A written list of the decision criteria
- A written list of the key uncertainties

Defining a Problem

- Problem recognition- recognizing a problem exists
- Problem acceptance- deciding to focus attention and resources on it
- Problem representation- articulating the problem for the Corps and others and linking it to possible solutions



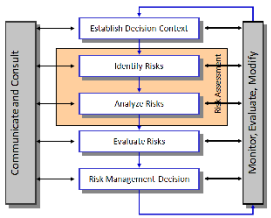
Identify Risks

Outputs

- A narrative description of the risks or significant uncertainties of concern to this risk management activity.
- A decision whether or not to pursue a risk assessment.

Tasks

- Start of risk assessment when one is done
- Identify
  - Presenting/existing risks
  - Risk reductions
  - Residual risks
  - Risk transformations
  - Risk transfers
- Methods depend on nature of activity, process, or asset



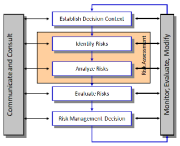
Analyze Risks

Outputs

- Written answers to the risk managers' questions with a focus on relevant uncertainties
- Descriptions of formulated alternative risk mitigation strategies
- Risk characterization of each significant risk with a focus on relevant uncertainties
- Formal risk assessment if required

Tasks

- Remainder of risk assessment: Each individually identified risk is analyzed
  - Gather information
  - Assess consequences and likelihoods, pull together in risk characterization
  - Identify and assess significant sources of uncertainty
  - Identify options for achieving RM objectives and solving the problems
  - Evaluate efficacy of risk management options while accounting for uncertainty

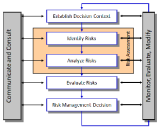


Evaluate Risks

Outputs

- Decision on acceptability/TLR
- An effective summary or display of the uncertainties most relevant to the risk manager's decision
- Display of the varying contributions of the risk management options to the risk management objectives and other social values considered in the decision process

TLR
Tolerable Risk
Unacceptable Region
Risk cannot be justified except in extraordinary circumstances
Increasing Individual risks and societal concerns
Tolerable Region
People and society are prepared to accept risk in order to secure benefits
Broadly acceptable Region
Risk regarded as insignificant, further effort to reduce risk not required



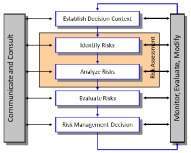
Risk Management Decision

Outputs

- Determination of a tolerable level of risk for this risk management issue
- Selection of the best risk management option
- Identify a measurable desired outcome to monitor the option's success
- When appropriate, an adaptive management plan
- An implementation plan
- An implemented plan

General Strategies

- Take risk
- Accept risk
- Manage risk
  - Avoidance
  - Reduce probability of event (prevent)
  - Reduce consequence of event (mitigate)
  - Insurance
  - Retain the risk



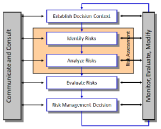
Communicate, Consult and Collaborate

Outputs

- Preparing and executing a public involvement plan including provisions for risk communication

Throughout

- Keep all stakeholders informed about
- Continual communication among participants to minimize misunderstandings and surprises at the end of the process
- Risk communication as appropriate



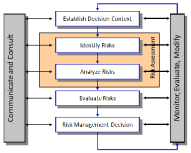
Monitor, Evaluate, Modify

Outputs

- A plan for monitoring, reviewing and modifying the implemented solution
- Implementation of that plan

Meaning

- Implication of uncertainty is RM is evolutionary decision making
- Assure decision is having desired outcome
- Monitoring gather information that measures progress toward desired outcome(s)
- Information is evaluated to determine if adequate progress is being made toward outcomes
- If outcomes are not satisfactory changes are needed
- A mechanism for change, e.g. adaptive management plan, is part of best practice



Risk-Informed Planning

- What problems do you see?
- What benefits do you see?

Part 4

SCINTILLATING EXPLORATION OF RISK ASSESSMENT

HEP

- Bass HSI model
- http://www.nwrc.usgs.gov/wdb/pub/hsi/hsi-016.pdf

What?

- Is uncertain?
- Is variable?

Think About It

- Estimating for 3 mile stretch of river
- Measurement at an access point for reach
  - %Pools~75
  - %Cover~8
  - Temperature~21.7
  - Salinity~1
  - Fluctuation~.8
  - Current velocity at .8~30.5

Qualitative Risk Assessment Methods Toolbox

- Increase or Decrease Risk
- Risk Narratives
- Evidence Mapping
- Screening
- Ratings
- Rankings
  - Enhanced Criteria Ranking

- Operational Risk Management (Risk Matrix)
- Develop a Generic Process
- Qualitative Assessment Models
- Multi-Criteria Decision Analysis

For Addressing Uncertainty

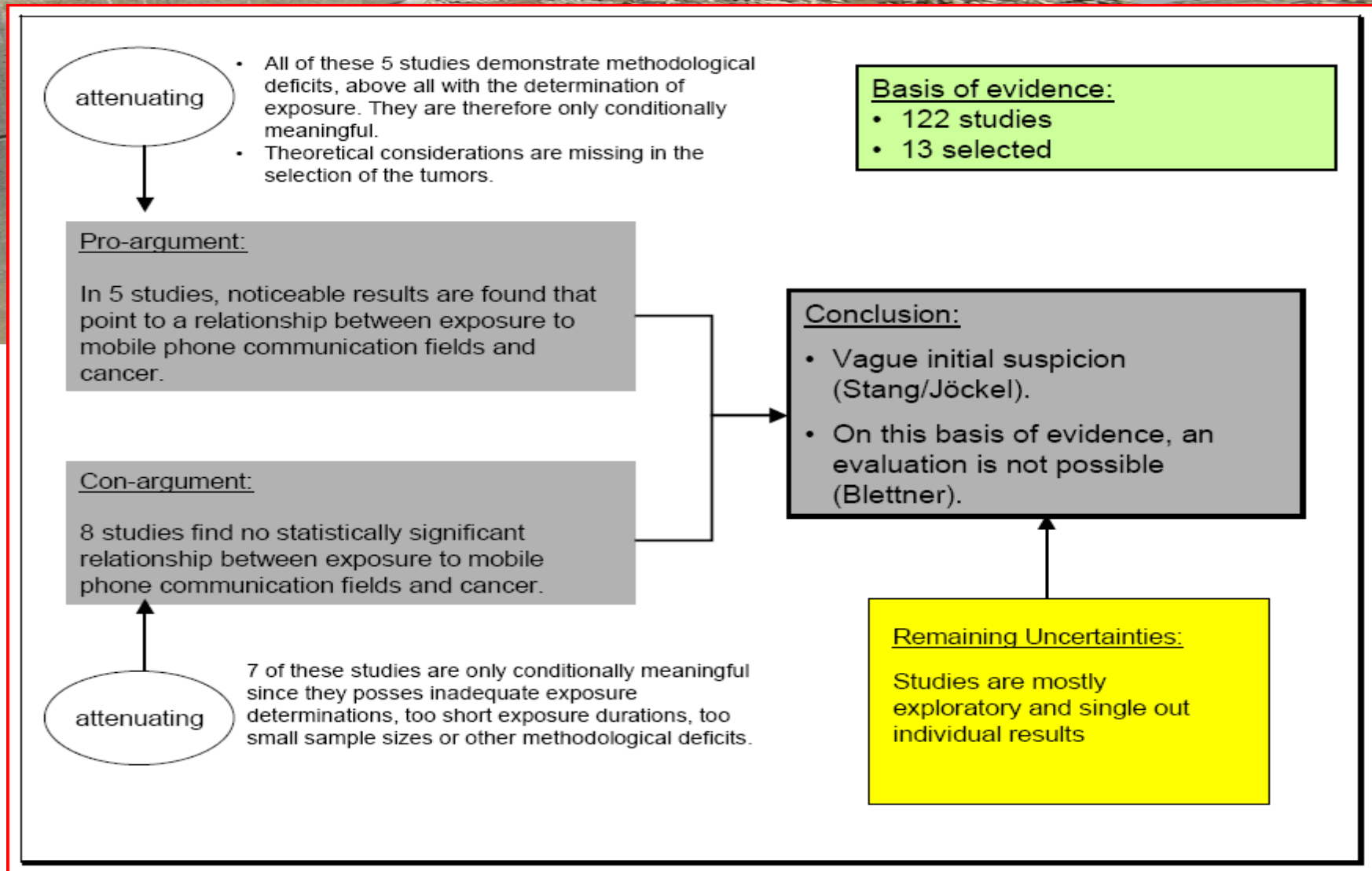

attenuating
All of these 5 studies demonstrate methodological deficits, above all with the determination of exposure. They are therefore only conditionally meaningful.
Theoretical considerations are missing in the selection of the tumors.
Basis of evidence:
122 studies
13 selected
Pro-argument:
In 5 studies, noticeable results are found that point to a relationship between exposure to mobile phone communication fields and cancer.
Conclusion:
Vague initial suspicion (Stang/Jöckel).
On this basis of evidence, an evaluation is not possible (Blettner).
Con-argument:
8 studies find no statistically significant relationship between exposure to mobile phone communication fields and cancer.
attenuating
7 of these studies are only conditionally meaningful since they posses inadequate exposure determinations, too short exposure durations, too small sample sizes or other methodological deficits.
Remaining Uncertainties:
Studies are mostly exploratory and single out individual results

Figure 4: Evidence framework for epidemiology of carcinogenic diseases

Enhanced Criteria Ranking

GATES
Criteria #1: Age H = Twenty and above Years of Age. M = Ten to Twenty Years of Age. L = Zero to Ten Years of Age.
Criteria #2: Frequency of Use. H = Daily Use-approximately 365 times a year. M = Great than one and less than 365 times a year. L = Annual use-Once a Year.
Criteria #3: Consequence of Failure. H = Loss of Life and/or Property. M = Structure Damage. L = Minimal Loss of Property and/or Damage.

Likelihood

Consequence

Gate	Criteria 1	Criteria 2	Criteria 3
Knightsbridge	H	L	M
Steadly	H	M	M
Redwood	M	H	L
Jackflash	M	H	L
Cantget	L	L	L
Roughjustice	H	M	L
IORR	L	M	H
19	L	H	L

Risk Characterization

- Question to Answer
- Evidence-based ratings
- All Possible Combinations of Ratings
- Ranking
- Evaluate Reasonableness of Ranking
- Add Criteria
- New Combinations of Ratings
- New Ranking

ORM Risk Assessment Values

TABLE A-I. **Suggested mishap severity categories.**

Description	Category	Environmental, Safety, and Health Result Criteria
Catastrophic	I	Could result in death, permanent total disability, loss exceeding $1M, or irreversible severe environmental damage that violates law or regulation.
Critical	II	Could result in permanent partial disability, injuries or occupational illness that may result in hospitalization of at least three personnel, loss exceeding $200K but less than $1M, or reversible
Marg		
Negl		

TABLE A-II. **Suggested mishap probability levels.**

Description*	Level	Specific Individual Item	Fleet or Inventory**
Frequent	A	Likely to occur often in the life of an item, with a probability of occurrence greater than 10^{-1} in that life.	Continuously experienced.
Probable	B	Will occur several times in the life of an item, with a probability of occurrence less than 10^{-1} but greater than 10^{-2} in that life.	Will occur frequently.
Occasional	C	Likely to occur some time in	Will occur several

What is your evidence for these judgments? That is the key. Otherwise some of these tools are less than worthless.

Let the evidence speak.

TABLE A-III. **Example mishap risk assessment values.**

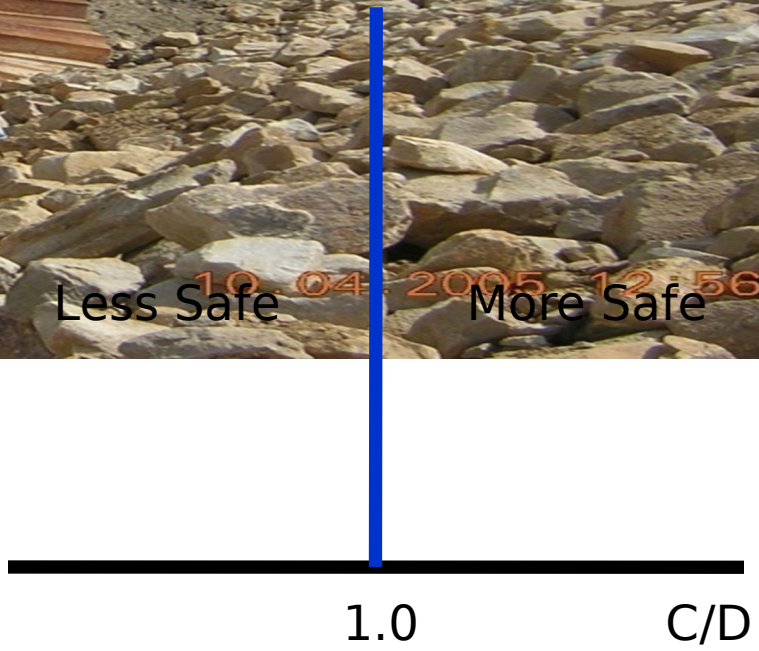
SEVERITY PROBABILITY	Catastrophic	Critical	Marginal	Negligible
Frequent	1	3	7	13
Probable	2	5	9	16
Occasional	4	6	11	18
Remote	8	10	14	19
Improbable	12	15	17	20

Quantitative Risk Assessment

- Safety Assessment
- Scenario Planning
- Scenario Analysis
  - Deterministic Scenario Analysis
  - Probabilistic Scenario Analysis
- Sensitivity Analysis
- Uncertainty Analysis
- Modeling
- Vulnerability Assessment

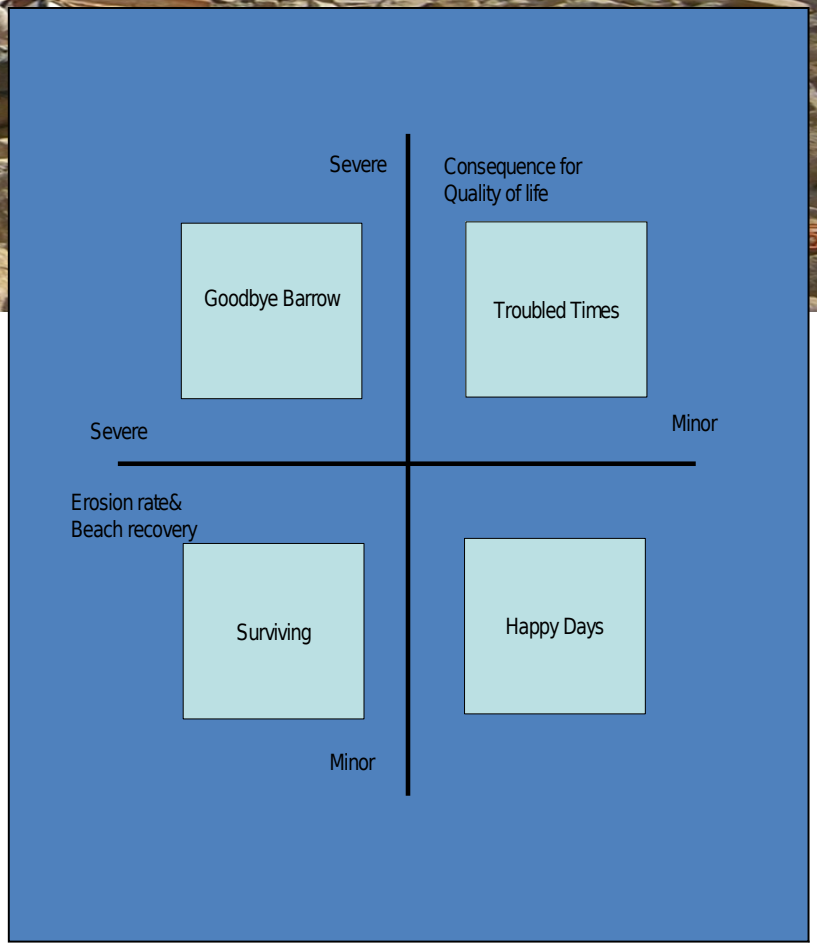
Safety Assessment

- Estimate component capacity
- Estimate demand or load on component
- C/D >1 => safety

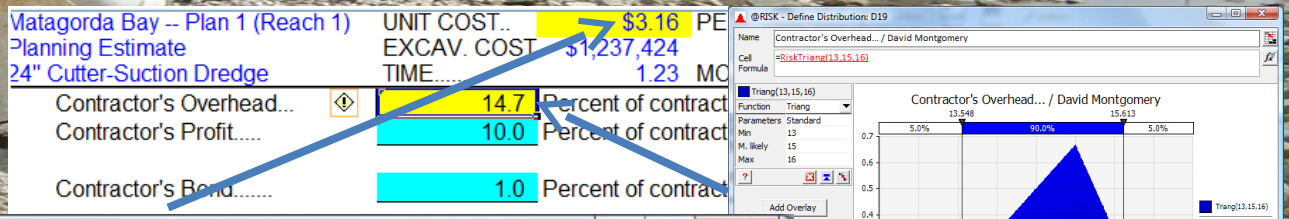


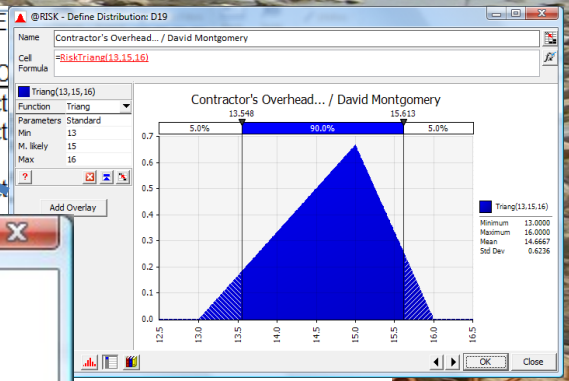
Scenario Planning

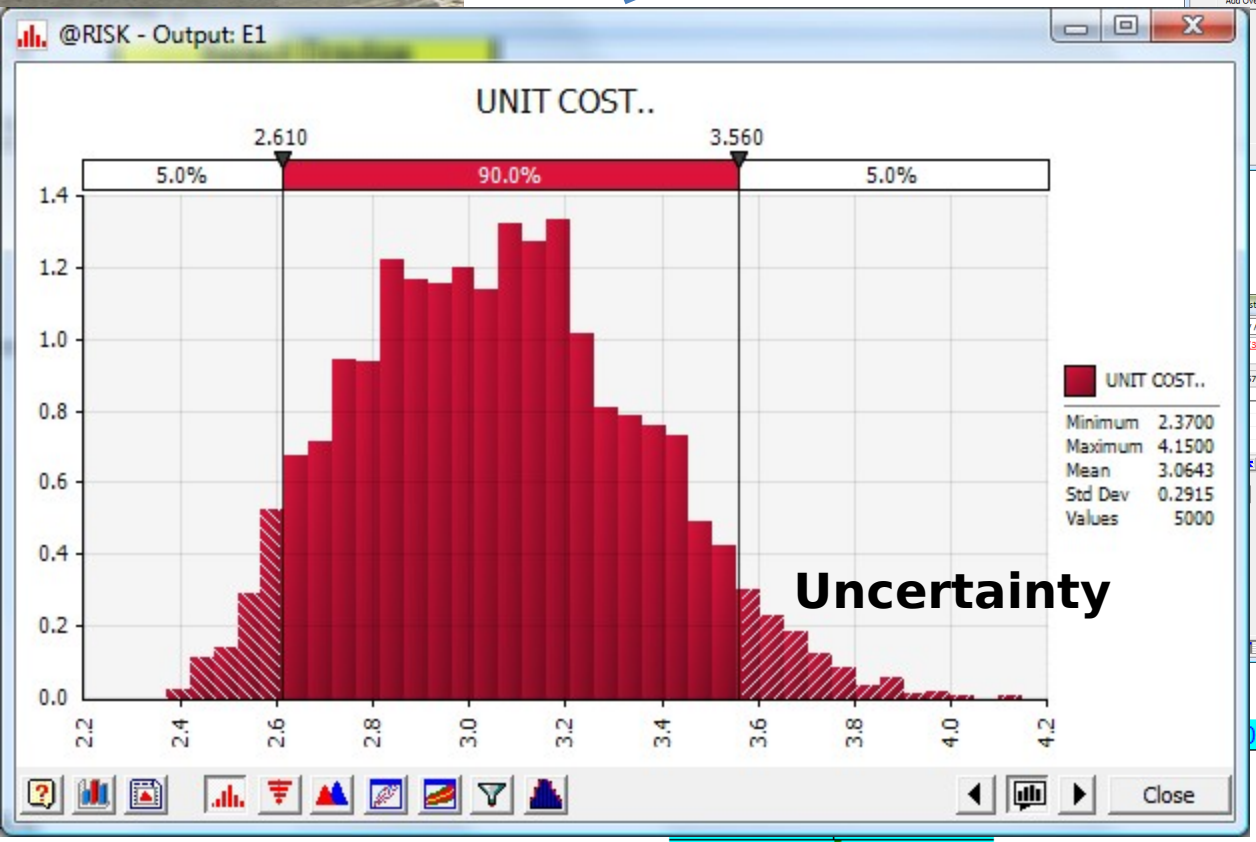
- Scenarios are:
  - Narratives
  - Alternative plausible futures
  - Significantly different views of the future
  - Decision-focused views of future
  - “Movies”-capture evolving dynamics of future
  - Products of team insight and perception
- Not
  - Predictions
  - Variations around a theme
  - Alternative forecasts of a key variable
  - Snapshots of an endpoint
  - Generalized views of feared or preferred futures
  - Products of outsiders

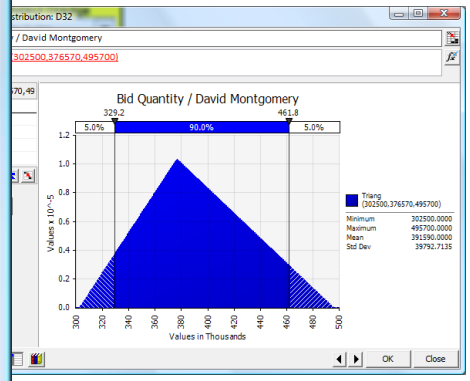


Probabilistic Risk Assessment

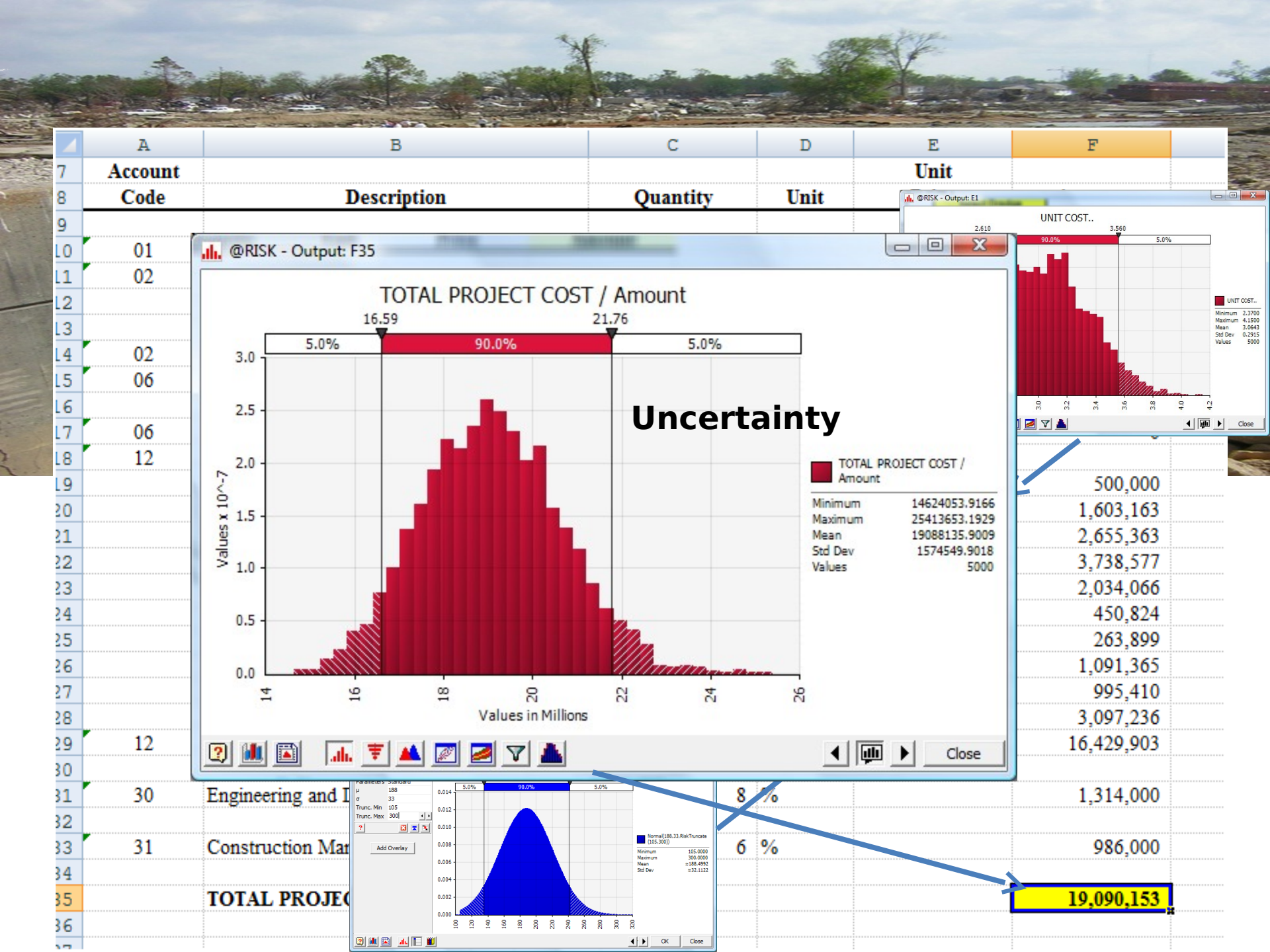

Matagorda Bay -- Plan 1 (Reach 1)
Planning Estimate
24" Cutter-Suction Dredge
UNIT COST.. $3.16 PE
EXCAV. COST $1,237,424
TIME..... 1.23 MO
Contractor's Overhead... 14.7 Percent of contract
Contractor's Profit..... 10.0 Percent of contract
Contractor's Bond..... 1.0 Percent of contract

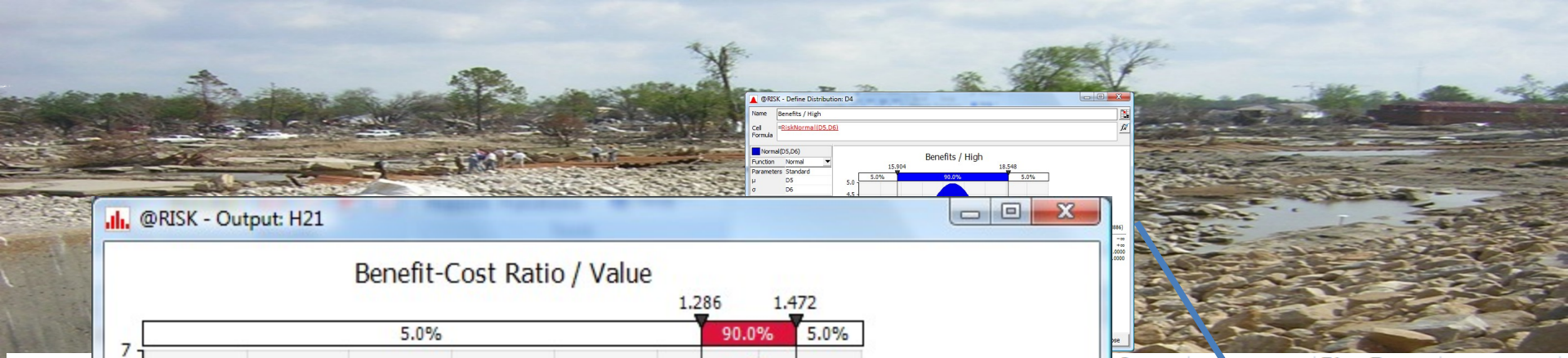


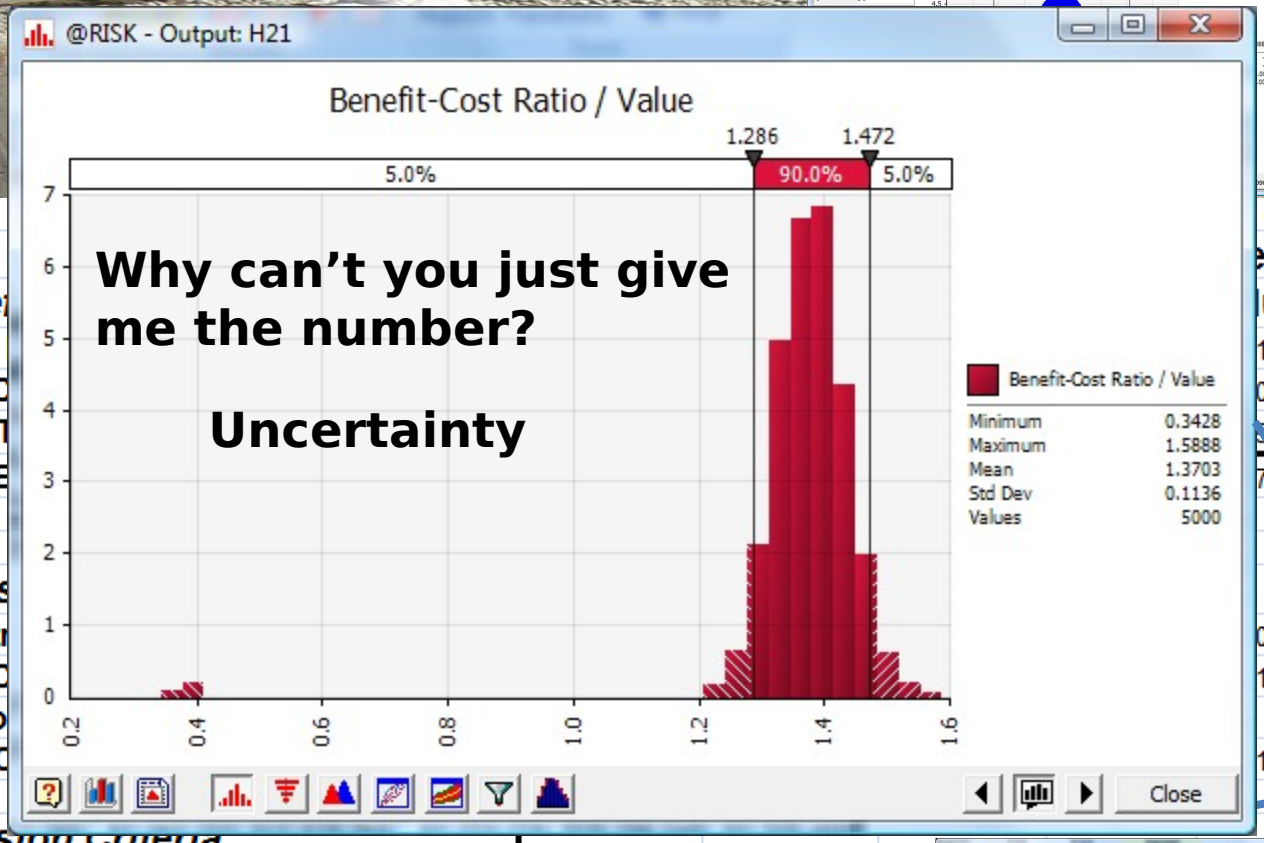




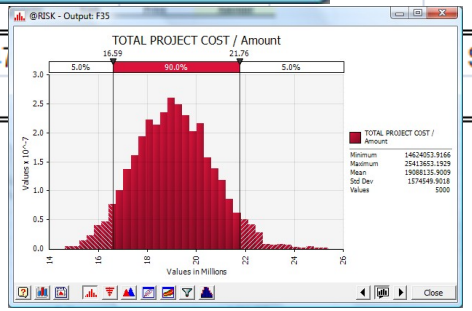
COMP. SHELL	0.5	1.666666667	%	RESULTANT MATERIAL
SOFT ROCK	0.4	0	%	FACTOR= 1.98
BLAST. ROCK	0.25	0	%	


A
B
C
D
E
F
Account Code
Description
Quantity
Unit
Unit
01
02
02
06
06
12
12
30
31
Engineering and D
Construction Mar
TOTAL PROJEC
8 %
6 %
500,000
1,603,163
2,655,363
3,738,577
2,034,066
450,824
263,899
1,091,365
995,410
3,097,236
16,429,903
1,314,000
986,000
19,090,153
@RISK - Output: F35
TOTAL PROJECT COST / Amount
16.59
21.76
5.0%
90.0%
5.0%
Values x 10^-7
Values in Millions
Uncertainty
TOTAL PROJECT COST / Amount
Minimum 14624053.9166
Maximum 25413653.1929
Mean 19088135.9009
Std Dev 1574549.9018
Values 5000
Close
@RISK - Output: E1
UNIT COST..
2.610
3.560
90.0%
5.0%
Close
Add Overlay
OK
Close





				6		Plan 7	
				esent		Present	
Benef				lue	AAE	Value	AAE
ATON				110,000	$7,595	$110,000	$7,595
O&M C				038,544	$485,967	$12,669,379	$874,740
Base T				58,180	$1,143,237	$13,246,544	$914,590
Total E				706,724	$1,636,799	$26,025,923	$1,796,925
Costs							
Constr				006,885	$828,999	$9,254,322	$638,952
O&M C				168,807	$425,917	$10,298,433	$711,041
Enviro				$0	$0	$0	$0
Total C				175,692	$1,254,9	$19,552,755	$1,349,993
Decision Criteria							
Net Benefits	$2,652,492	$183,138	-$47		$381,883	$6,473,169	$446,931
Benefit-Cost Ratio	1.15	1.15			1.30	1.33	1.33



@RISK - Output: H21

Benefit-Cost Ratio / Value

1.286 1.472

5.0% 90.0% 5.0%

12.5% 80.4% 7.1%

Each plan has a range of possible outcomes

Uncertainty

The risk manager must decide how to handle this uncertainty

Benefit-Cost Ratio / Value

Minimum	0.3428
Maximum	1.5888
Mean	1.3703
Std Dev	0.1136
Values	5000

Benefit-Cost Ratio / Value

Minimum	0.7744
Maximum	1.6719
Mean	1.3640
Std Dev	0.0859
Values	5000

Benefit-Cost Ratio / Value

Minimum	0.2746
Maximum	1.4749
Mean	1.1451
Std Dev	0.1097
Values	5000

Benefit-Cost Ratio / Value

Minimum	0.9216
Maximum	1.4732
Mean	1.1755
Std Dev	0.0725
Values	5000

Close

Risk Road Show | Removable Disk (G:) | Inbox - Windows Liv... | Frontier Mail: Inbox ... | Executive overview ... | Microsoft Excel non... | Snipping Tool

3:56 PM

Part 5

APOCALYPTIC TEASE ON RISK-INFORMED DECISION MAKING

Benefits and Costs

- Let’s look at an example
- Think about how to be honest about all this uncertainty and how to describe these risks

How are you going to explain that?

- What numbers will you use?
- What will you say about them?
- What kinds of graphics do you want to see?

In a Nutshell

- Decision making is going to change if we do risk assessment
- Making decisions under uncertainty
  - Just give me the number is done
- Using the available information
  - Considering more than expected value
  - Working with probabilities

Risk-Informed Decision Making

- Confluence of risk management and risk assessment
  - Assessors convey significance of uncertainty
  - Managers take it explicitly into account in decision making
- Develops and uses risk information to aid decisions made under uncertainty
  - Decision metrics and rules developed by decision makers
  - Use risk assessment approach to develop science-based values of risk metrics

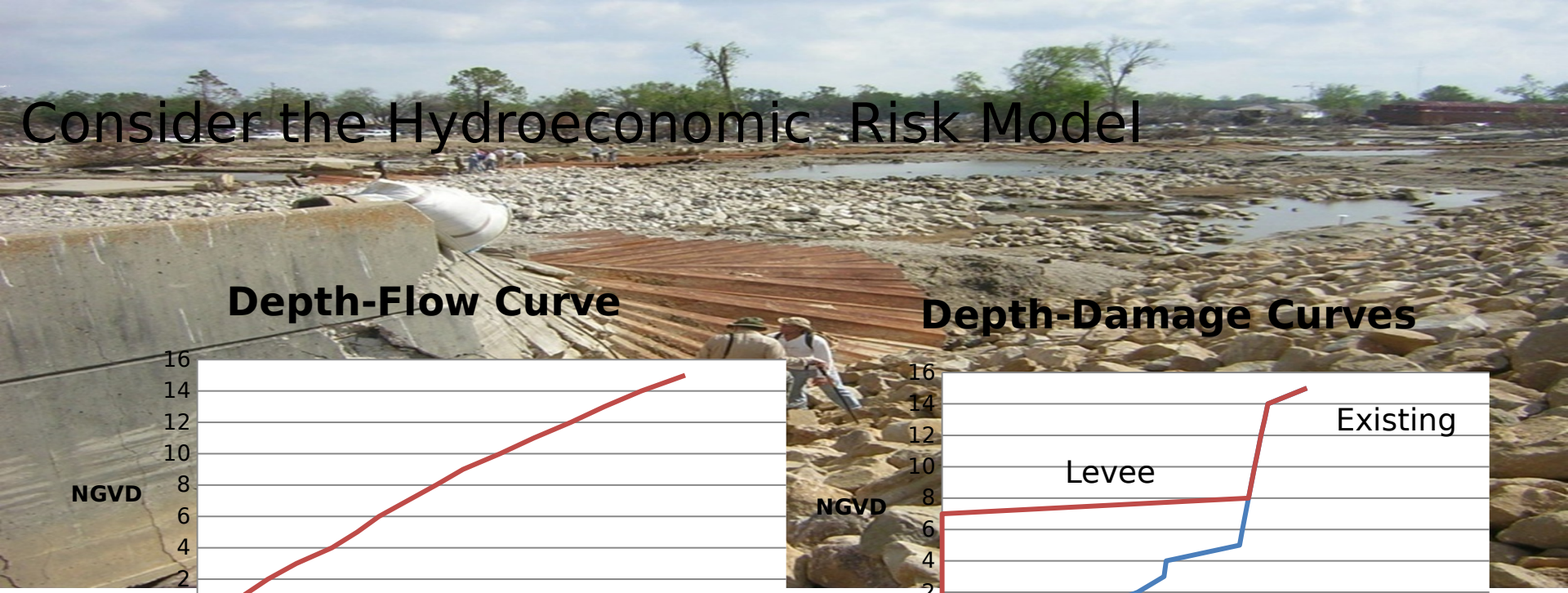
Metrics

- Decision criteria will reflect
  - Risk metrics
    - Life safety, economic risks, PUP, and more
  - Other risk management objectives
    - These are the usual impacts of interest to decision makers
      - Costs, benefits, compliance with laws, budget impacts, capability, and so on

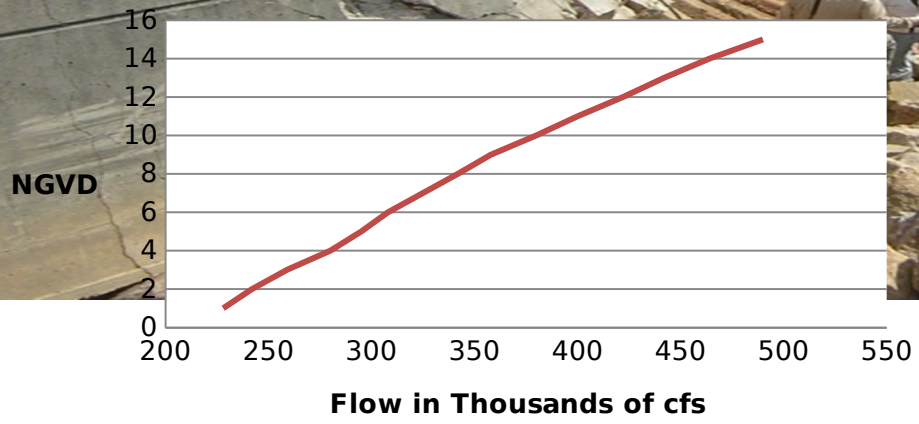
First, Understand

- …assessors have to become more clever and help risk managers know what is possible
- …conditional probabilities can help
  - …given that something happens then how bad is it?

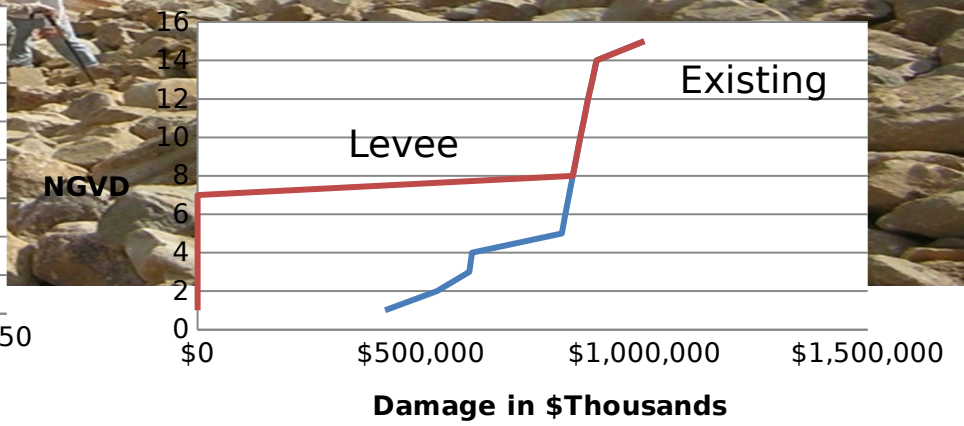
Consider the Hydroeconomic Risk Model



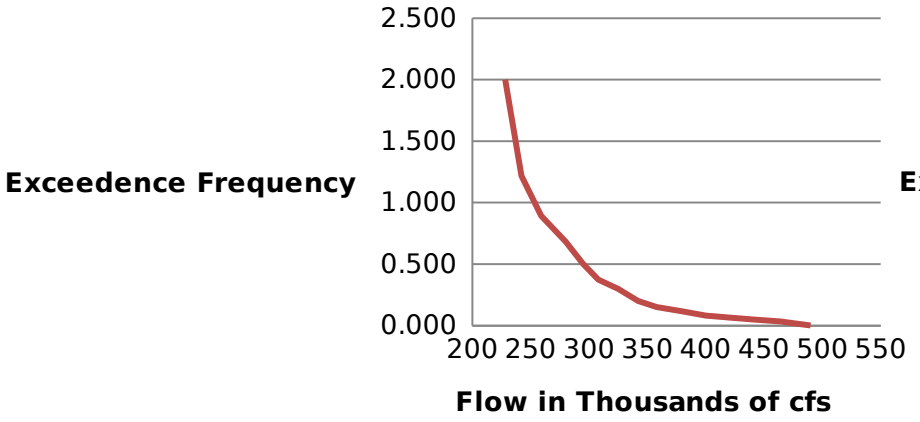
Depth-Flow Curve



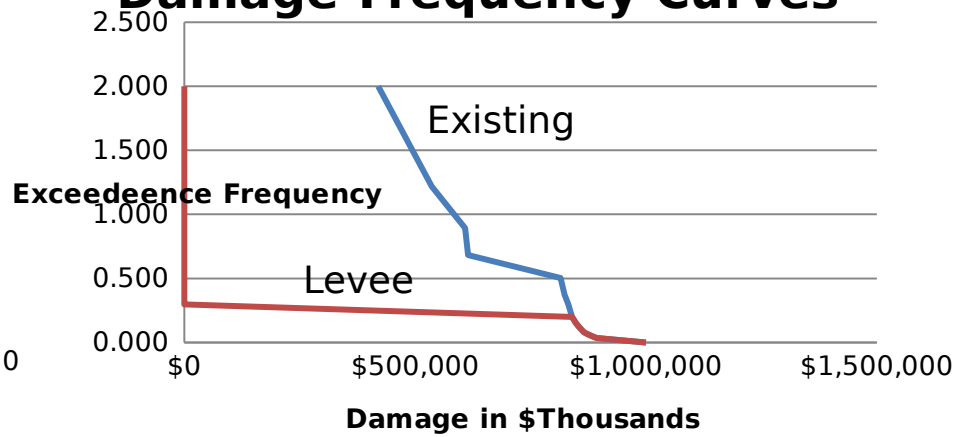
Depth-Damage Curves



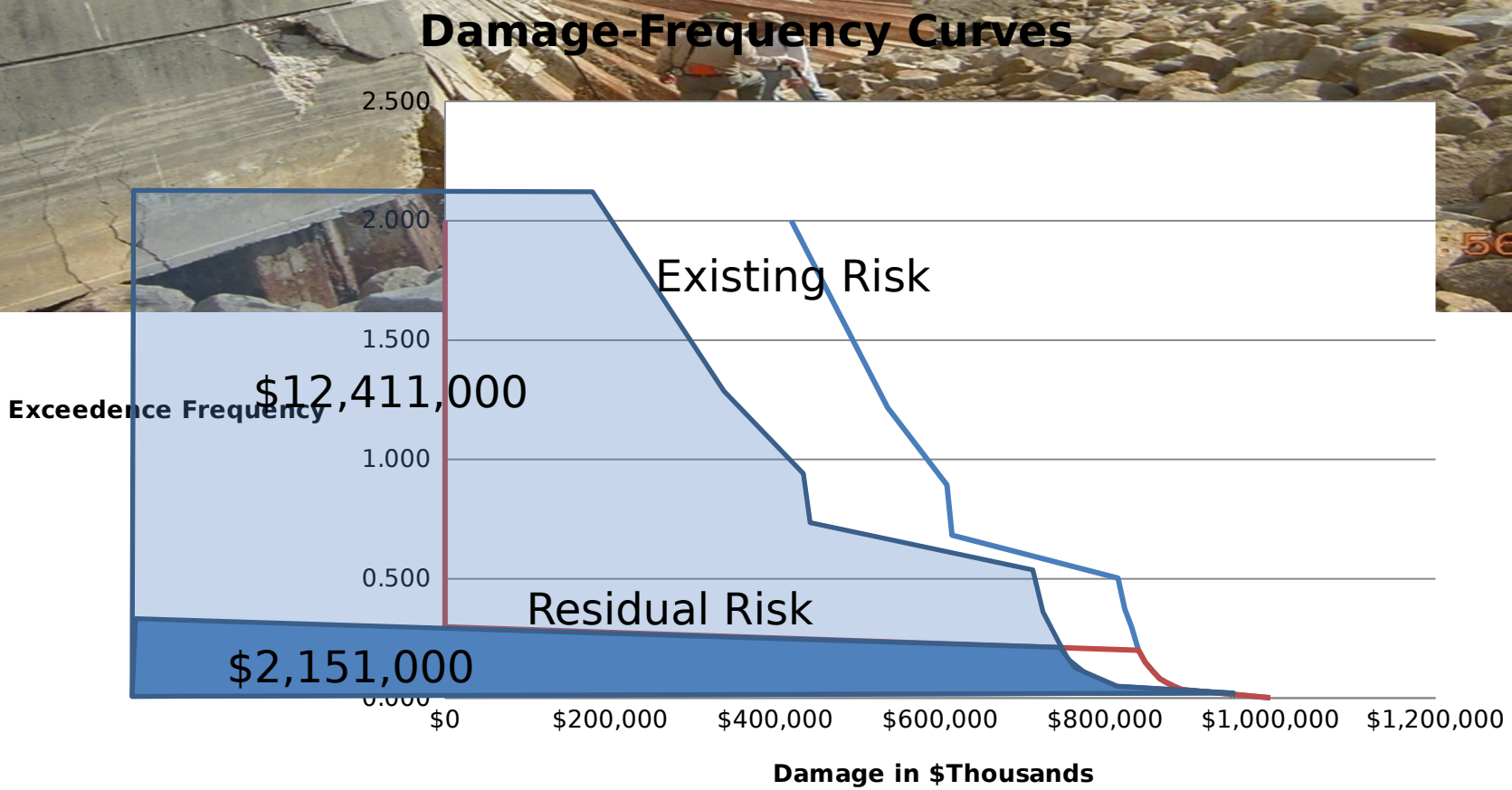
Flow-Frequency Curve



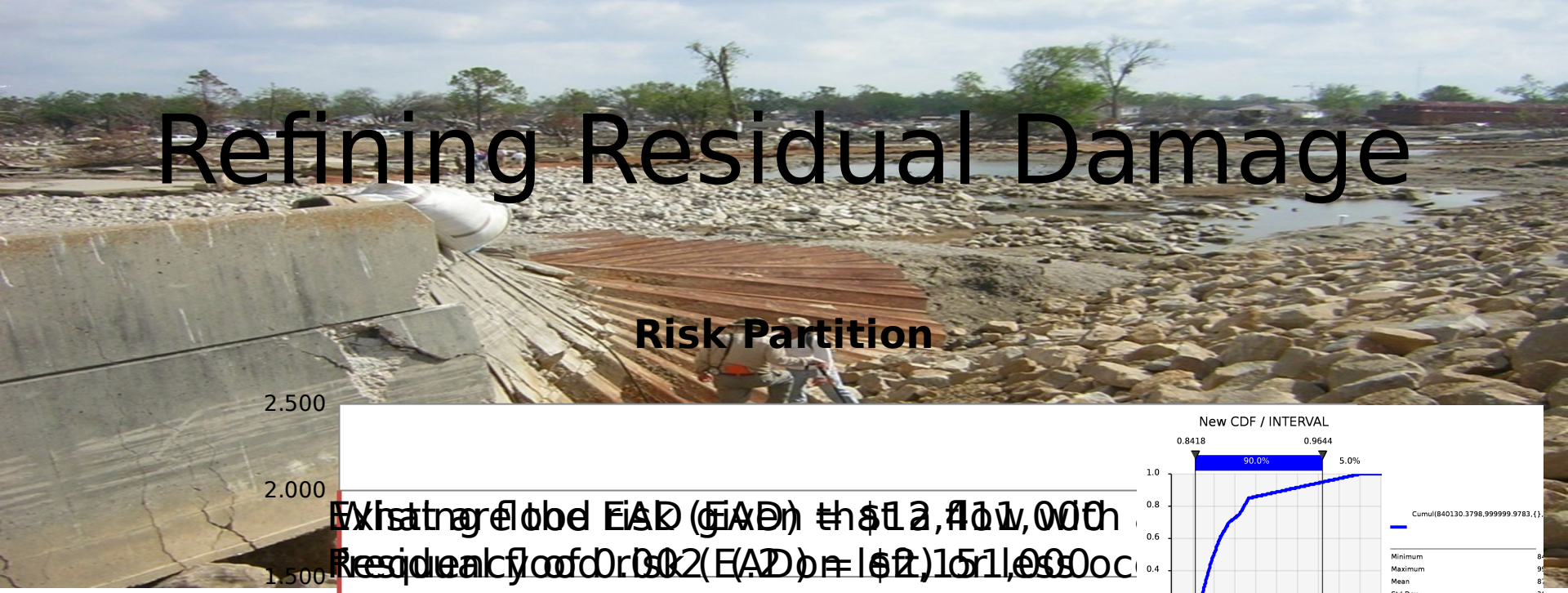
Damage-Frequency Curves

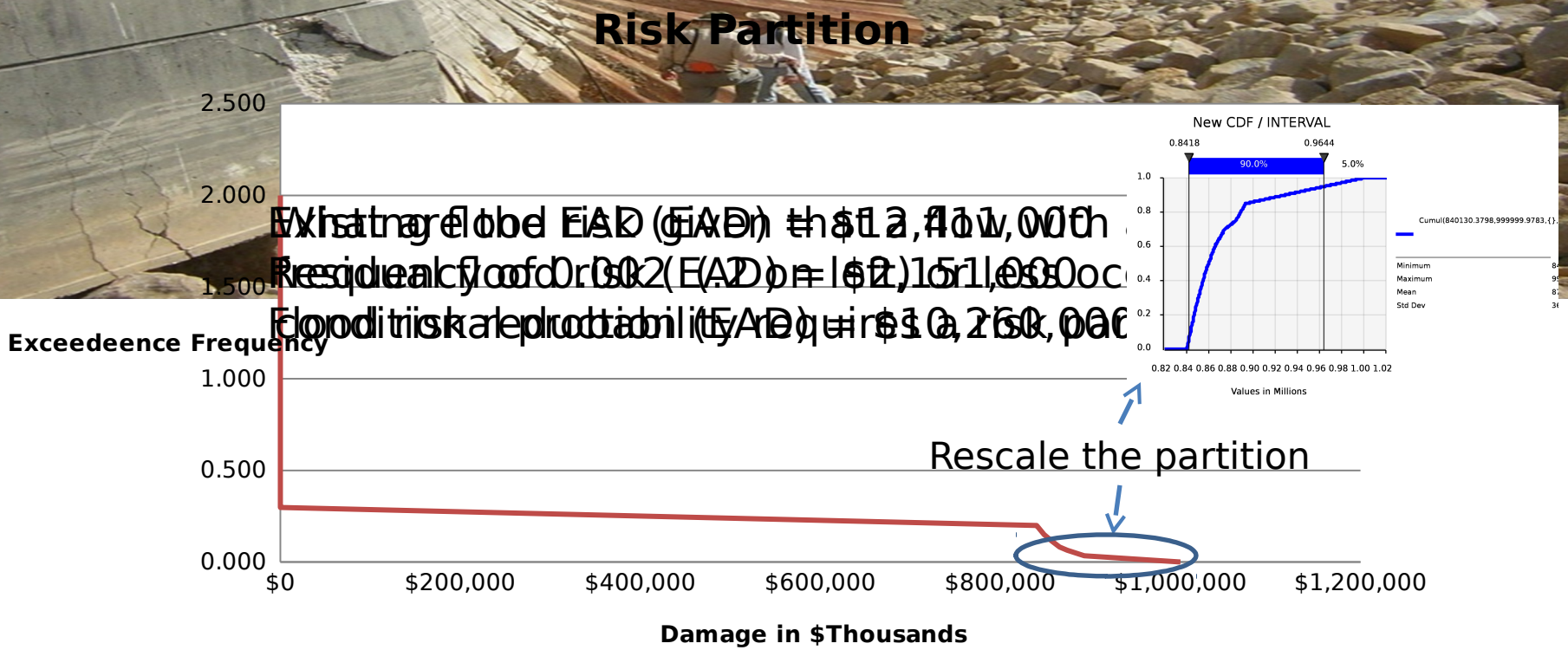


Expected Annual Damage



Refining Residual Damage





Integrate this rescaled partition and the expected damage is now $872,659,000. Given that a ‘bad’ flood occurs, it will be very bad.

Extreme Event Conditional Expected Values

- With condition residual = $2,151,000
- Benefits = $10,260,000
- Partitioned residual = $872,659,000
- A channel or nonstructural project could have lower benefits and a much reduced partitioned risk

Principles for Choosing Management Option

- Policy
- Zero Risk
- Weight-of-evidence
- Precautionary Principle
- ALARA Principle
- ALOP Principle
- Reasonable Relationship
- Safety Standards

Part 6

TRIPLE TRIUMVIRATE TRILOGY ON RISK COMMUNICATION

"PERSONS NOT HEEDING EVACUATION ORDERS IN SINGLE FAMILY, ONE OR TWO STORY HOMES WILL FACE CERTAIN DEATH. ."

National Weather Service
Hurricane Ike Warning for Galveston
September, 2008

3 Topics

- Corps stuff
- Uncertainty
- Crisis communication

Communication Models

Basic Communication Model

- Uni-directional or we tell “them” approach
- Who says - what - when – to whom - through what channel - with what effect

Risk Communication Model

- Multi-directional
- Actively involves the audience as an information source

Risk Communication Elements

Multi-directional & actively involves the audience as an information source

- Audience assessment
- Audience involvement
- Message
- Logistics
- Metamessaging
- Listening
- Self-assessment
- Evaluation

Risk Communication is Trans-Disciplinary

- Environmental Sciences
- Social Psychology
- Philosophy
- Political Science
- Communication
- Engineering
- Economics
- Public Health
- Natural Sciences

Risk & Crisis Communication

Preparedness & Recovery

- Planned, tested, strategic
- Pre-event activities
- Multi-directional
- Proactive
- Certain

Crisis Response

- Spontaneous
- Post-event
- Uni-directional
- Reactive
- Equivocal

Untitled Document - Windows Internet Explorer

http://www.hq.usace.army.mil/cepa/releases/FloodfightRelease20Jun.html

examples of effective warnings

Articles by Topic | Mail :: Inbox | Untitled Document

FOR IMMEDIATE RELEASE **June 20, 2008**

Army Corps of Engineers Assists Federal, State and Local Authorities with Midwest Flood Fight

WASHINGTON—Approximately 250 U.S. Army Corps of Engineers civilians are working with federal, state and local agencies in support of historic flooding in the Midwest region. The Corps is working side by side with local responders to monitor and advise on the stability of levees while providing professional engineering expertise and materiel during the flooding.

To date, the Corps has provided:

- 110 pumps, 2,700 rolls of plastic sheeting, and 13.2 million sandbags to support the flood fight. The sandbags, if laid end-to-end, would span from San Francisco to Washington, D.C.
- Debris removal, temporary housing, technical assistance and movement of commodities to communities across Iowa.
- Drinking water to Iowa and Illinois residents.
- Soldiers from the 249th Engineer Battalion, the Army's power generation experts, to support critical facilities with the temporary emergency power assessments in Iowa.
- Experts to monitor a portion of the Mississippi River, which is currently closed to barge traffic because of high water safety concerns.
- GIS (Geospatial Information System) experts to produce a variety of flood related mapping that aids in preparedness, response and recovery efforts.

According to Corps officials, 32 levees have overtopped (seven federally authorized, 21 non-federally authorized, and four private levees, see definitions of levee types below). The potential exists for one to two inches of rain within the basin over the next few days that will continue to stress the river.

In response, the Corps has deployed civilian experts from three major inland river systems, Mississippi, Missouri and Ohio, to monitor and assess the stability of the Mississippi River levees against forecasted river levels.

For more information regarding the Corps' assistance to the flood fight, visit www.usace.army.mil.

NOTE: A *federally authorized levee* is a levee designed and built by the Corps then turned over to a local sponsor to operate, maintain, repair and replace the levee. A *non-federally authorized* levee is a levee designed and built by a non-federal agency, which is responsible for the operation, maintenance, repair and replacement of the levee. The Corps has no responsibility for *private* or *corporate-owned levees*.

-30-

Internet | Protected Mode: On 100%

What Risk Communication is Not

- Spin
- Public relations
- Damage control
- Crisis management
- How to write a press release
- How to give a media interview
- Always intended to make people “feel better” or reduce their fear

Is This Risk Communication?

U.S. Army Corps of Engineer Talking Points #5 1100 June 20

US ARMY CORPS OF ENGINEERS TALKING POINTS #5

PUBLIC SAFETY

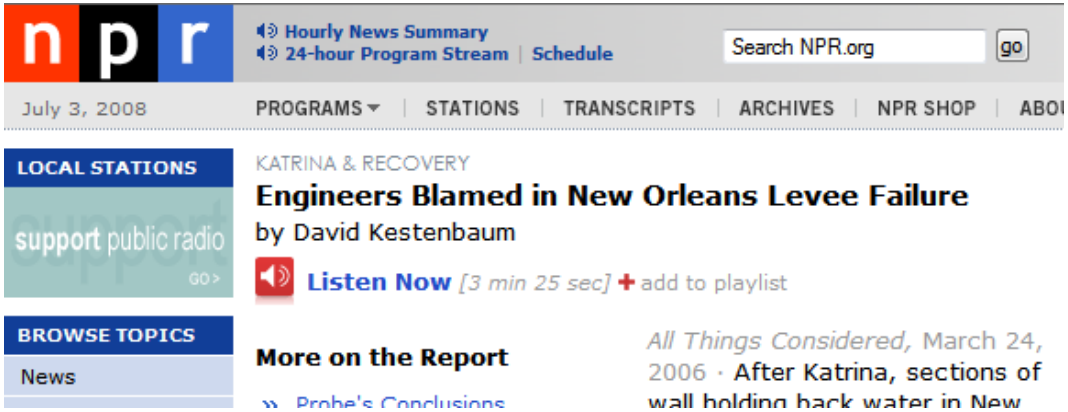
- Public Safety is our number one priority.
- Residents must follow directions from their local emergency management officials.
- The levees, although some have overtopped, worked as intended to buy critical time for local emergency management officials to safely evacuate residents. In some cases it has allowed additional time to protect property.
- Flood risk management is a shared responsibility and partnership among federal, state local agencies and private landowners
-
-

Which of these three goals does this serve?

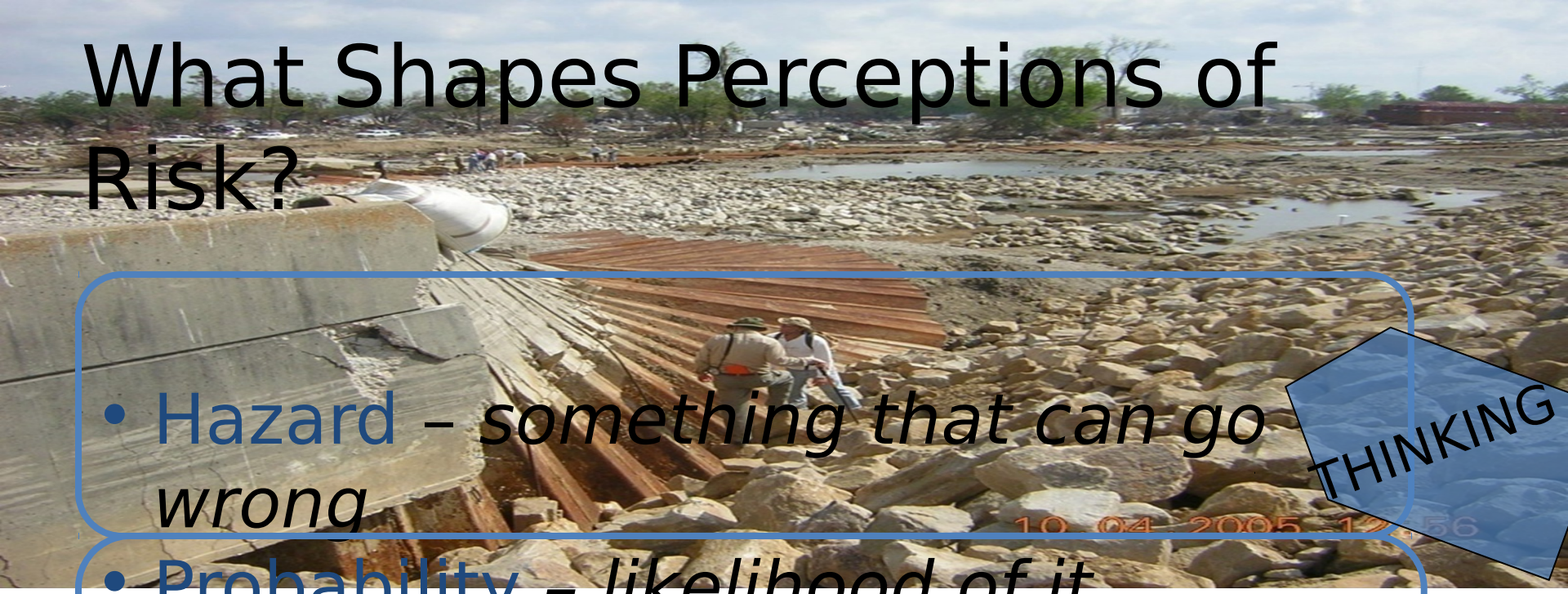
- Tailor communication so it takes into account the emotional response to an event.
- Empowers stakeholders and public to make informed decisions.
- Prevent negative behavior and/or encourage constructive responses to crisis or danger.

Interpreting Risk

- Communicating about risk is difficult because of the way people interpret risk
- Involves competing perspectives: objective vs subjective



What Shapes Perceptions of Risk?



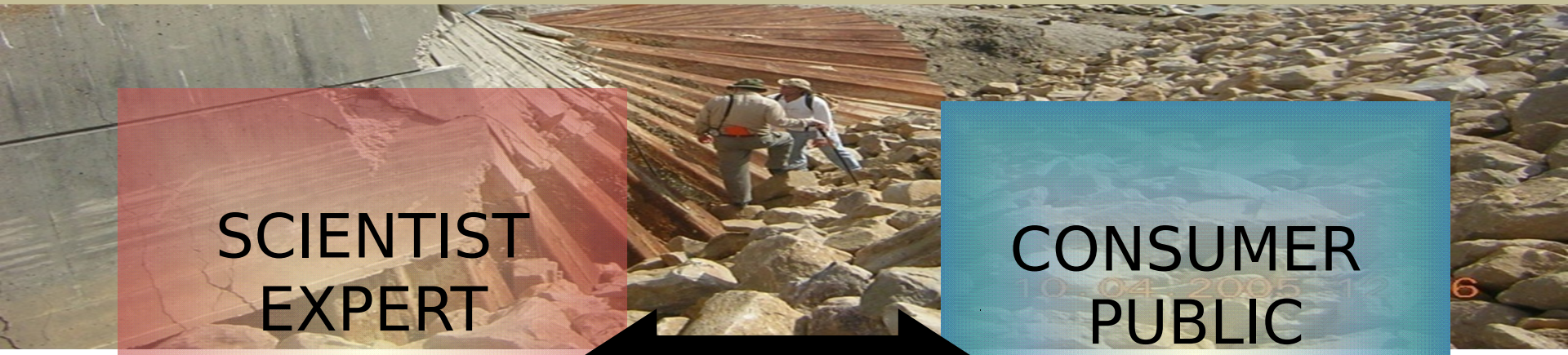
- Hazard – *something that can go wrong*
- Probability – *likelihood of it happening*
- Consequences – *implications of hazard*
- Value – *subjective evaluation of the relative importance of what might be lost*

THINKING

FEELING

Scientist - Consumer

3 risk communication strategies based on this



SCIENTIST EXPERT	CONSUMER PUBLIC
knows thinks	*feels believes*

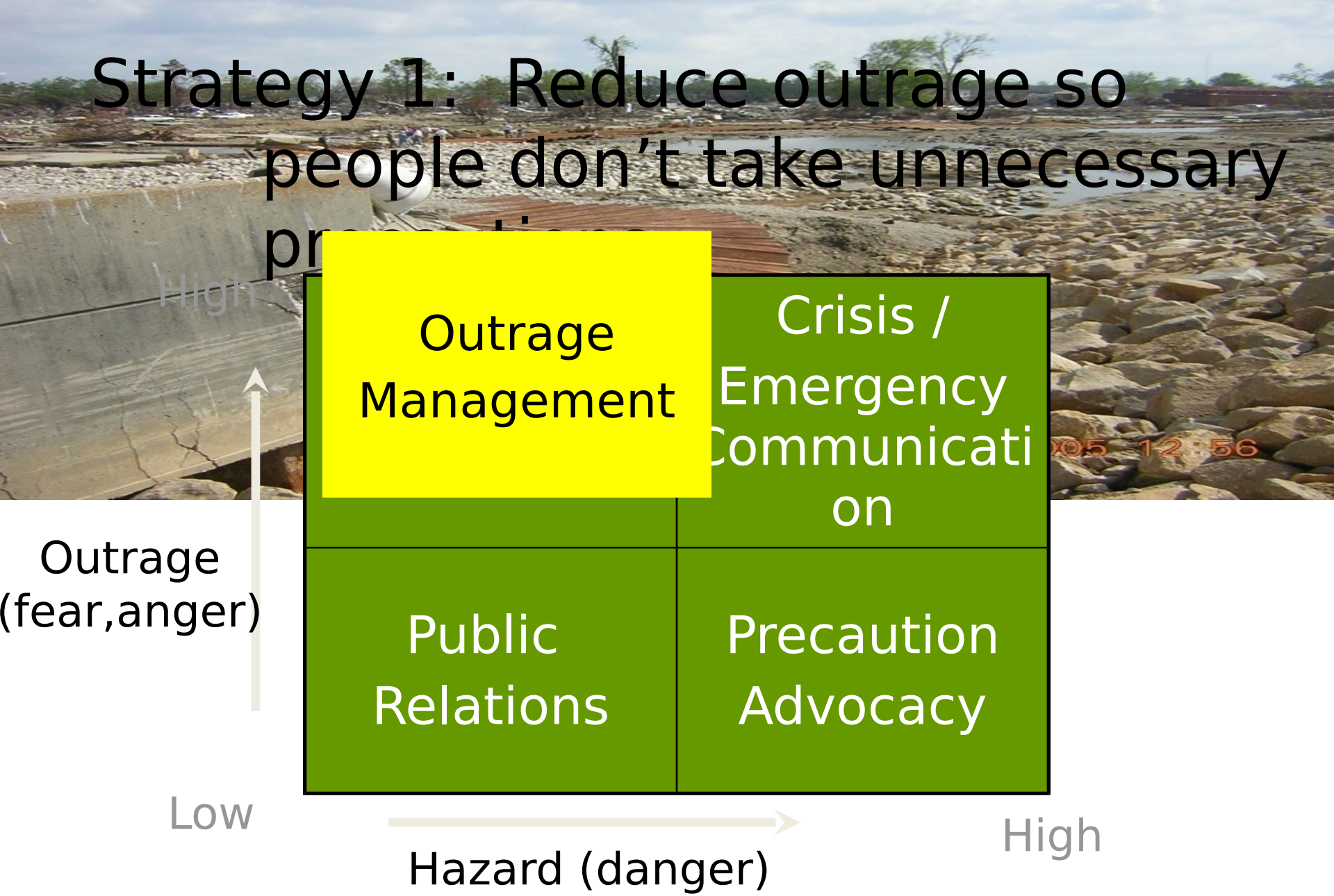
Fact-based:

hazard, probability

Value-based:

consequences, value

Strategy 1: Reduce outrage so people don't take unnecessary pr[illegible]



Strategy 2: Increase concern for a real hazard to motivate preventive action

High

Outrage (fear,anger)

Outrage Management	Crisis / Emergency Communication
Public Relations	Precaution Advocacy

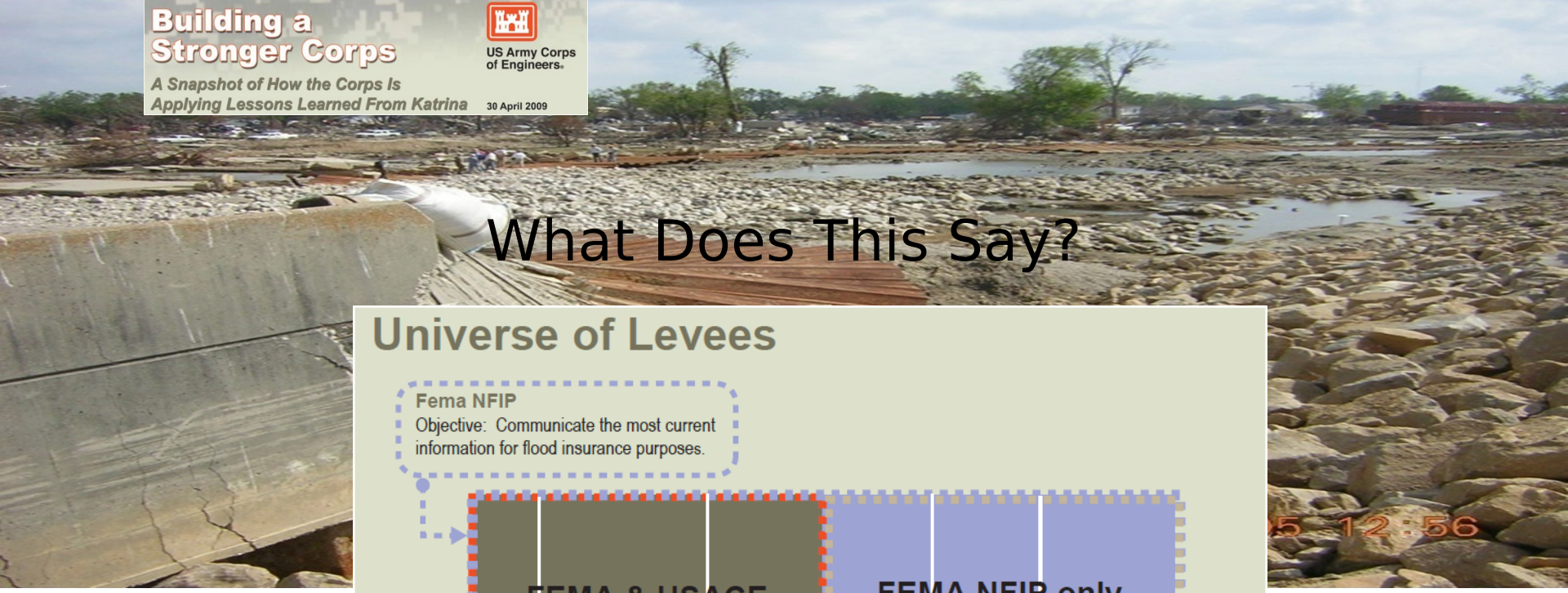
Low

High

Hazard (danger)

Strategy 3: Acknowledge hazard, validate concern, give people ways to act

3 examples of bad risk communication


Building a Stronger Corps
A Snapshot of How the Corps Is Applying Lessons Learned From Katrina
US Army Corps of Engineers
30 April 2009

What Does This Say?

Universe of Levees

Fema NFIP
Objective: Communicate the most current information for flood insurance purposes.

1% Annual Change Event

Level of Protection

FEMA & USACE			FEMA NFIP only		
Fed O&M	USACE built / Local O&M	Local built / Enrolled in RIP: PL84-99	Other Federal Levees	Other State Levees	Other Local and Private Levees
USACE only			No prior nexus with NFIP or USACE		

1 2 3 4

Levee Categories

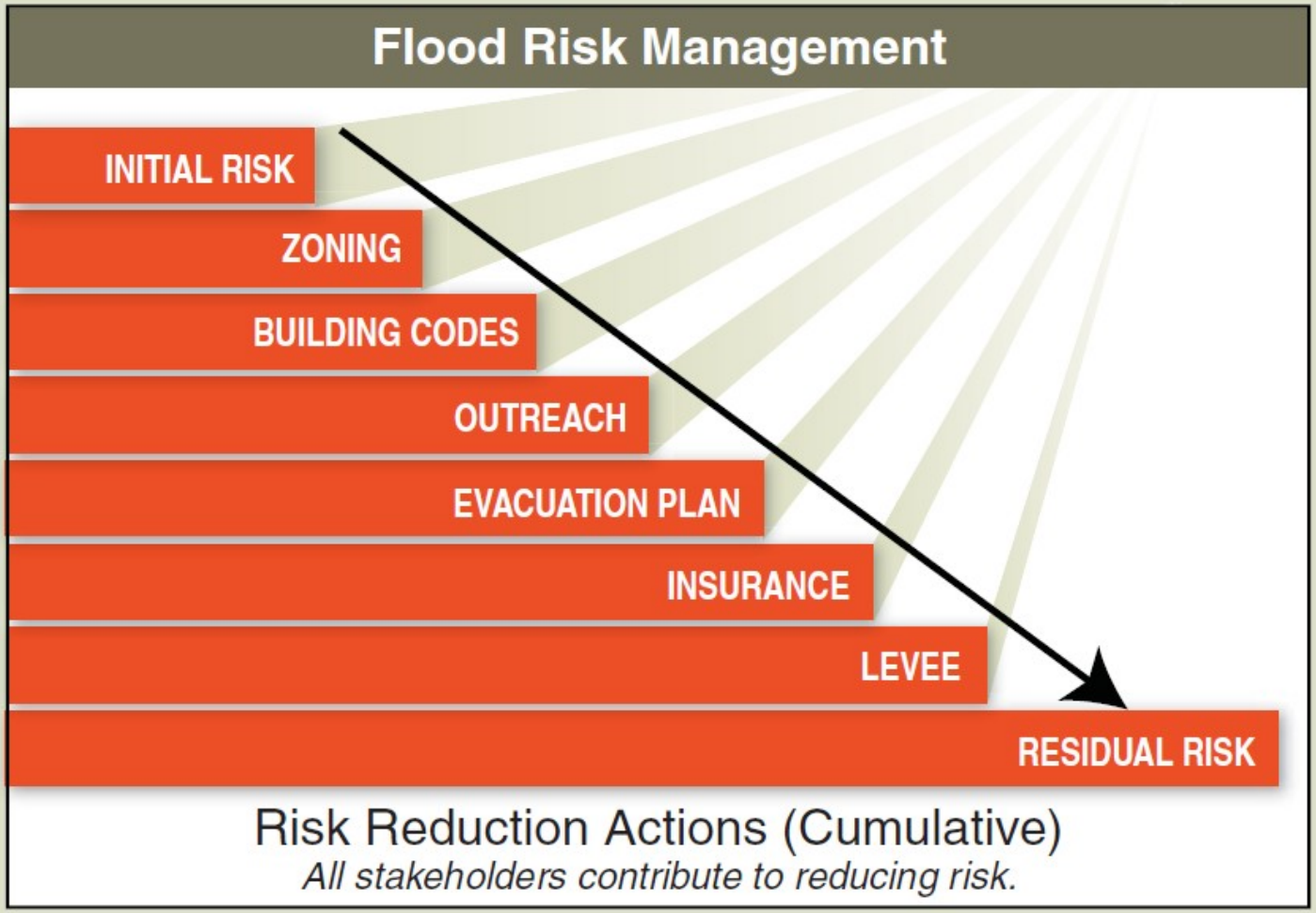
USACE Sep08
Not to scale

USACE Inventory and Assessment Objective: ***Assess all levees*** in USACE programs, regardless of level of protection

National Levee Safety Act Objective: ***Inventory and Inspect*** all levees in nation, regardless of level of protection.

Building a Stronger Corps
A Snapshot of How the Corps Is Applying Lessons Learned From Katrina
US Army Corps of Engineers
30 April 2009

What Does This Suggest?



(USACE)

Glossary

1 Percent Risk Reduction: A hurricane risk reduction design (e.g., a levee design) based on a flood elevation that statistically has a 1% chance of being equaled or exceeded in any given year.

1 Percent Event: An event, e.g., storm, flood, surge, or wave level, that statistically has a 1% chance of being equaled or exceeded in any given year. (This does not necessarily mean that, once such a flood occurs, the location will not experience another for the next 99 years.)

Do the Opposite

- We are trained to be complex, it gets better grades
- We are trained to be impersonal, don’t show emotions
- We love our data
- No comment at this time

Three Things to Remember

- Motivation
- Simplification
- Orientation

Motivation

- When people are outraged numbers don’t help or hurt
- How you explain data is irrelevant
- Outraged people do not want to hear or believe the data
- Motivate folks to want to hear

- Reduce outrage
- Make people want to hear the numbers
  - Share power-if I make the decision I care about the numbers
  - Ask what people are interested in and want to know

Simplification

- Simplify language
- Simplify graphics
- Simplify content

Orientation

- Tell people where you are and where you are going
- Use risk comparisons carefully
- Don’t tell more than you know
  - Explain uncertainty
  - The right attitude

Explaining Uncertainty

- Never
certa
- Don’t
confr
ackn
uncer
- Put b
uncer
- Clarif
more certain about

some things than others

xplain what you

re

12:56

e the

g

very

ifficult

er, say

We need might need middle answers.

We don’t know yet but it is probably this or this or this based on what our experts are telling us.

If you guess wrong credibility is gone

Explaining Uncertainty

- Never say th… is
- X
- not
- that
- ility
- ng
- …y be less important than taking appropriate precautions now
- Don’t perpetuate uncertainty

We’re pretty certain but we’re not going to get much more definite any time soon.

We’re rather uncertain now but soon will have answers and know more.

We’re extremely uncertain and will stay extremely uncertain for a long time

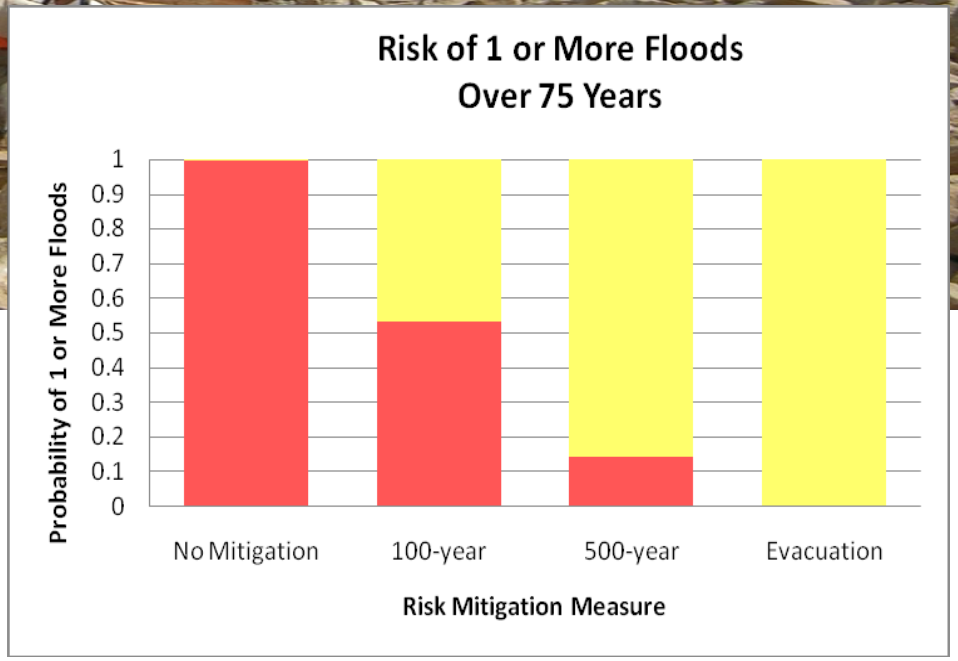
Risk Communication

- This is what we are absolutely certain of…
- This is what we think is likely but is by no means proven
  - ERDC results?
- This is what we think is unlikely but still possible
- This is what we have no good thoughts on

Flood Risk Management

10-yr Floodplain Occupant

Time in floodplain	Probability of 1 or more floods
10 years	
25 years	
30 years	
75 years	
100 years	



Message Maps

Use message maps to

- Promote pre-event preparedness
- Anticipate stakeholder questions & concerns
- Provide framework for organizing information
- Craft clear, concise key messages
- Promote message consistency within an organization

Here's Why--Communication Shifts in LOW to HIGH Stress Situations

LOW Stress	HIGH Stress
Process avg of 7 messages	Process avg of 3 messages
Info processed in linear order (1,2,3)	Info processed in primacy (1,3,2) or recency order (3,2,1)
Info processed at avg grade level	Info processed at *minus* 4 grade levels
Focus on competence, expertise, knowledge	Focus on listening, caring, empathy, compassion

SOURCE: Vincent Covello

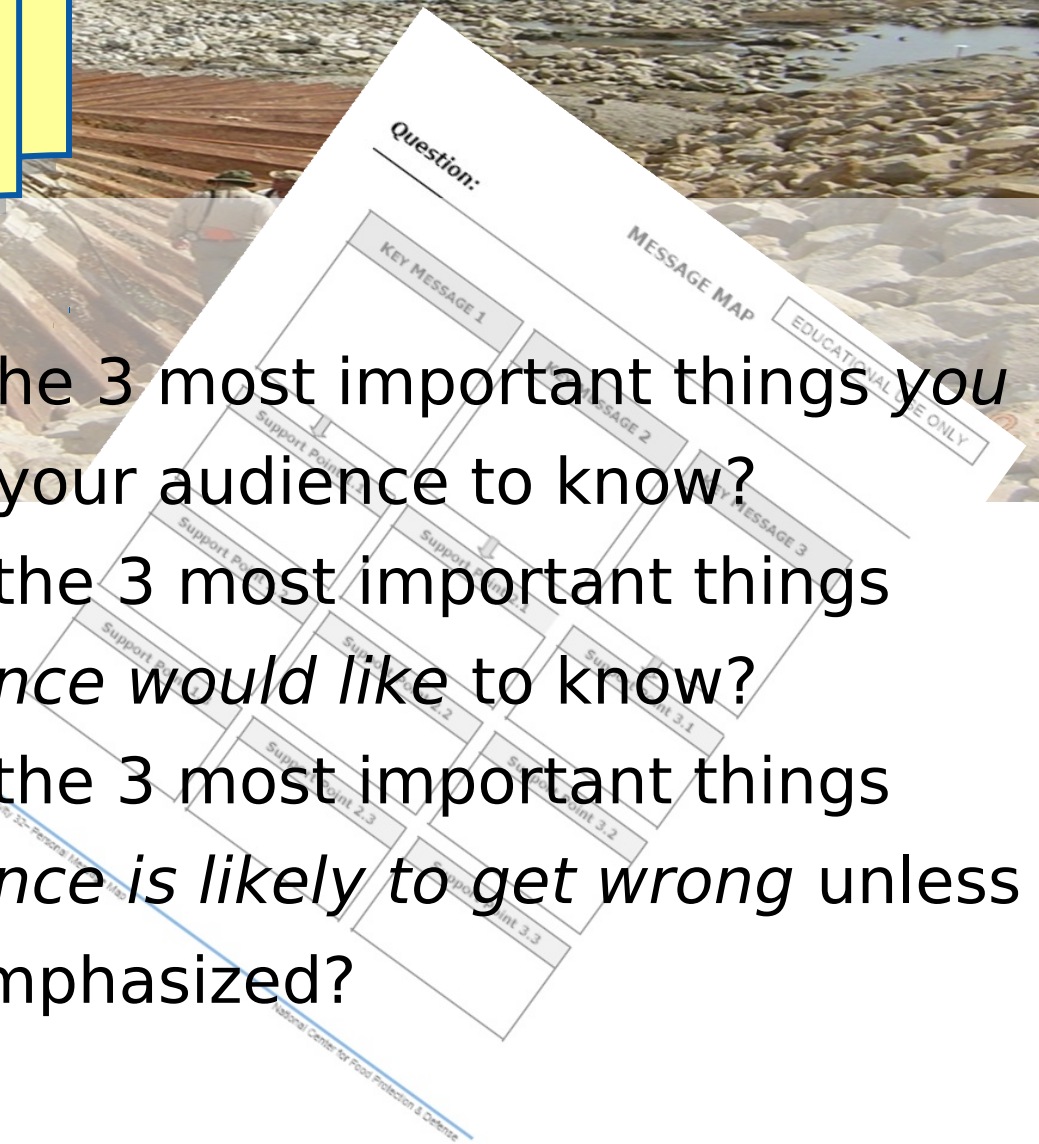
Based on Rule of Three

During high stress situations:

- *Present 3 key messages*
- *Repeat key message 3 times*
- *Prepare 3 supporting messages for each key message*

Key Messages

Message Mapping



1. What are the 3 most important things *you would like* your audience to know?
2. What are the 3 most important things your *audience would like* to know?
3. What are the 3 most important things your *audience is likely to get wrong* unless they are emphasized?

The 27/9/3 challenge

- *In a total of 27 words*
- *Delivered in 9 seconds*
- *3 key messages*

SOURCE: Vincent Covello

Message mapping

Key Message

Should be able to stand alone

 # 1

1a

1b

1c

3 Supporting Ideas

- *Supporting factual information*
- *Visual aids*
- *Citations to credible third parties info*
- *Sources of more information*

uestion: What should I know about anthrax ?

1. ***Anthrax is a dis- ease that can affect people & animals.***	2. ***Anthrax occurs naturally in the soil.***	3. ***Anthrax is both preventable and treatable.***
1a *Anthrax is caused by bacteria that form spores.*	**2a** *Anthrax occurs worldwide.*	**3a** *Effective vaccines are available for livestock.*
1b *The spores can be inhaled, swallowed or enter the skin (contact).*	**2b** *Spores are resistant to man disinfectants.*	**3b** *Vaccines for humans are develop-ed & can be used prior to or after exposure.*
1c *Animals most commonly affected are cattle, sheep & goats.*	2c *Anthrax spores can survive for many years in soil without an animal*	**3c** *Early treatment with antibiotics can be effective.*

estion: Do trees impact slope stability?

1. Roots can affect the way water moves through soil.	2. These results are not valid for all levees	3. Slope stability is essential to levee performance
1a Water can move soil	2a There are x levees and each is different	3a The root/soil system is critical
1b When soil moves in a levee, it may not perform as intended	2b we used levees where we found cooperative districts	3b Root effects on permeability are variable
1c We modeled this soil movement to better understand how this works	2c they are not representative but they are good examples	3c Core pressure can be increased or decreased (making up words!)